

PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-01	SHEET	1	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723879.2 N, 457603.8 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6 tri-cone bit

DRILLIN	DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6 tri-cone bit ORIENTATION: Vertical											
<u>WATE</u> R	LEVELS	: 2 ft bgs	on 03/15	/07	START: 3/14/2007	END: 3/21/2007	LOGGE	R : R.	Bitely			
				STANDARD		OIL DESCRIPTION			COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME II	SCS GROUP SYMBOL,	COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,			
ACE		RECOVE	RY (ft)		MOISTURE CO	NTENT, RELATIVE DEN	NSITY OR	l S	DRILLING FLUID LOSS, TESTS, AND			
무유 도			#TYPE	6"-6"-6"	CONSISTENCY,	SOIL STRUCTURE, MIN	NERALOGY	₹	INSTRUMENTATION			
41.6				(N)				107	"Water level is based on Ground Water			
-								┨	Monitoring at LNP site (FSAR Table -			
-								┨	2.4.12.08)" Water at 6' below ground surface			
-								┨				
-								┨	-			
-								┨	-			
-								┨	-			
-	3.5				Poorly Graded Sa	nd With Silt (SP-SM)		177	-			
-		1.0	SS-1	5-4-3	3.5-4.5' - very pale	orange to moderate y		甘草	<b>1</b> →			
5	E 0	1.0	00-1	(7)	\   \   \   \   \   \   \   \   \	to 10YR 5/4), wet, loos 15% fines, nonplastic,	<10% root	1:1:	1			
36.6	5.0				matter and organic	material, trace concre a sand and silt in an iro	etions up to $+$	1	Few dense lenses from 5.0-8.5', thin,			
-					1/4 , very line since	a sanu anu siil iii ali iil	JII IIIAUIX	1	relatively consistent drilling rate (moderately rapid)			
-								1	Tapiu)			
-								1	-			
-								1	-			
-								1	-			
-	8.5							1	]			
-	0.0	0.5	00.0	9-50/5	_ Limestone Fragme	ents		+	1			
-	9.4	0.5	SS-2	(59/11")	8.5-8.75' - very pal	e orange, (10YR 8/2), zed, subrounded to and	strong HCl gular, up to	╁	Very hard from 9.0-12.5', possible limestone			
10					\1"x1-1/2"		January 11 11	1	lenses, light chatter, extremely slow advancement rate			
31.6					Silt (ML) 8.75-9.0' - gravish	orange, (10YR 7/4), m	oist to wet.		_			
					hard, nonplastic, ra	apid dilatancy, mild to r	moderate	]				
					sand, all carbonate	5% very fine to mediun e derived	n grained					
-								]				
_								]				
_								1	Relatively consistent from 12.5-28.5', moderately rapid drilling rate			
-	13.5				0:14.14.14			<b> </b>	-			
_				27-17-4		<b>ne Fragments (ML)</b> ale orange, (10YR 8/2)	, wet, verv	4111	_			
-		8.0	SS-3	(21)	¬ stiff, nonplastic, mi	ld to moderate HCl rea	action,	╫	-			
15 <u> </u>	15.0				lenses (<1/2") at 13	o fine grained sand, 3 l 3.5', 13.7' and 14.0', al	l carbonate	-	-			
20.0					derived`			-	-			
-								-	-			
-								-	-			
-								-	-			
-								-	-			
-								1	-			
-	18.5							╁╥	SS-4 actual sample depth is 18.5-20.0'			
-		1.3	SS-4	40-54-50				$\  \ $	-			
	20.0	1.0	JJ-4	(104)				$\  \ $	-			
20	20.0							╫				
								1				



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723879.2 N, 457603.8 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6 tri-cone bit

SURFACE AND OF ELEVATION (ft)		INTERVA RECOVE	. ,	STANDARD PENETRATION TEST RESULTS  6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  Sandy Silt (ML) 18.5-19.75' - very pale orange, (10YR 8/2), moist, hard, nonplastic, rapid dilatancy, mild to moderate HCI reaction, 35-40% very fine to fine grained sand, all carbonate derived  Sandy Silt With Limestone Fragments (ML)
21.6	23.5	RECOVE	#TYPE	PENETRATION TEST RESULTS 6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  Sandy Silt (ML)  18.5-19.75' - very pale orange, (10YR 8/2), moist, hard, nonplastic, rapid dilatancy, mild to moderate HCI reaction, 35-40% very fine to fine grained sand, all carbonate derived  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
21.6			#TYPE		Sandy Silt (ML)  18.5-19.75' - very pale orange, (10YR 8/2), moist, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 35-40% very fine to fine grained sand, all carbonate derived
1.6		1.5	SS-5		18.5-19.75' - very pale orange, (10YR 8/2), moist, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 35-40% very fine to fine grained sand, all carbonate derived
25 :		1.5	SS-5		Sandy Silt With Limestone Fragments (ML)
	25.0			17-24-31 (55)	23.5-25.0' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 20% fine to coarse gravel, limestone
-					fragments are extremely weak rock (R0); similar to 18.5-19.75'
	28.5	0.8	SS-6	34-50/3.5 (84/9.5")	Silty Sand With Limestone Fragments (SM)  28.5-29.25' - Same as 23.5-25.0' except 72% fine to medium grained sand, interbedded with limestone lenses (<1/2") at 28.5-28.8' and intermittent throughout  Slow advancement rate from 28.5-33.5' with several dense lenses <0.5' thick, associated with light chatter
	33. <u>5</u> 33.7		SS-7	50/2.5 \(50/2.5")	Limestone Fragments  33.5-33.7' - grayish orange to dusky yellowish brown,
5_66-				, <del></del> ,	(10YR 7/4 to 10YR 2/2), mild to moderate HCI reaction, gravel-sized limestone fragments up 1-1/2" diameter, sample includes 1/2" thick iron cemented lenses that have no HCI reaction
+	38.5			00.05.50	-
- 0 - 1	39.6	1.1	SS-8	28-35-50/1 (85/7")	Extremely dense from 39.0-46.0', slow drilling with light to heavy rig chatter



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DRILLIN	GIVIETH	OD AND	EQUIPIN	ENT : Dietrich D-	0 S/N 232, mud rotary, cathead, NWJ rods, 6 tri-cone bit		ORIENTATION : Vertical
WATER	LEVELS	: 2 ft bgs	on 03/15	/07	TART: 3/14/2007 END: 3/21/2007 LOGGER	R : I	
300				STANDARD	SOIL DESCRIPTION	ا ا	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			3
품성E		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	1 2	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
FYA EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	Į.	INSTRUMENTATION
EL SU				(N)		Ú	
21.6					Sandy Silt (ML) 18.5-19.75' - very pale orange, (10YR 8/2), moist,	1	_
l _					hard, nonplastic, rapid dilatancy, mild to moderate	1	_
<u> </u>					HCl reaction, 35-40% very fine to fine grained sand, all carbonate derived		
					all carbonate derived	ı	
					•	1	1
-					•	1	1
-	23.5				-	1	1
_					Sandy Silt With Limestone Fragments (ML)	$\dagger$	₸
-		1.5	SS-5	17-24-31	23.5-25.0' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate to strong HCl	╢	1
25	25.0			(55)	reaction, 20% fine to coarse gravel, limestone	1	
16.6	20.0				fragments are extremely weak rock (R0); similar to 18.5-19.75'	╫	<del>'</del>
-					10.0-13.10	1	-
-						+	-
-					-	┨	-
-					-	┨	-
-						┨	-
-					-	-	-
-	28.5				One de Oile With Linearton Frances (ML)	╁	
_	20.0	0.8	SS-6	34-50/3.5 (84/9.5")	Sandy Silt With Limestone Fragments (ML)  28.5-29.25' - Same as 23.5-25.0' except 40% fine to	Ш	Slow advancement rate from 28.5-33.5' with several dense lenses <0.5' thick, associated
_	29.3			(04/3.3 )	medium grained sand, interbedded with limestone	⇃	with light chatter
30					lenses (<1/2") at 28.5-28.8' and intermittent throughout	1	
11.6					anoughout	╽	
_							
						1	
_					•	1	
_					-	1	1
1 -	33.5				•	1	1
1 -	33. <u>5</u> 33.7	0.2	SS-7	50/2.5	Limestone Fragments	Þ	╡ 1
-				(50/2.5")	33.5-33.7' - grayish orange to dusky yellowish brown, (10YR 7/4 to 10YR 2/2), mild to moderate HCI	1	-
25 -					reaction, gravel-sized limestone fragments up 1-1/2"	1	-
35 6.6					diameter, sample includes 1/2" thick iron cemented lenses that have no HCl reaction	1	
-					lenses that have no not reaction	┨	-
-						┨	-
-					-	1	-
-					-	4	-
-					-	-	-
-						1	-
1 -	38.5					╁,	_
1 -		1.1	SS-8	28-35-50/1	_		
1 _	39.6	'.'	33-6	(85/7")	_		Extremely dense from 39.0-46.0', slow drilling with light to heavy rig chatter
40						Ľ	Grining with light to neavy fig chatter
						Γ	
1		1	I			1	



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WATER	LEVELS	: 2 ft bgs	on 03/15	/07 5	START : 3/14/2007 END : 3/21/2007	LOGGEF	≀: R.	Bitely
>				STANDARD	SOIL DESCRIPTION		ဥ	COMMENTS
ANE (#	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISCS CROUD SYMPOL COLO	ND.	CLC	DEDTH OF CASING DOULING DATE
H BE ATIC		RECOVE	RY (ft)		MOISTURE CONTENT. RELATIVE DENSITY	OR	BOLI	DRILLING FLUID LOSS, TESTS, AND
EVENT ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERAL	.OGY	SYM	INSTRUMENTATION
1.6   DEPTH BELOW   (#)   DEPTH BELOW   (#)	43.5 43.8		ERY (ft)	50/3 (50/3") 28-50/2 (78/8")	SOIL NAME, USCS GROUP SYMBOL, COLO MOISTURE CONTENT, RELATIVE DENSITY CONSISTENCY, SOIL STRUCTURE, MINERAL.  Sandy Silt With Limestone Fragments (ML) 38.5-39.58' - olive gray to light olive gray, (5Y 3 5Y 5/2), wet, hard, low to medium plasticity, slor rapid dilatancy, moderate to strong HCI reaction fine to coarse grain sand, trace organic content limestone interbeds at 38.5-38.7' and intermitte throughout  Limestone Fragments 43.5-43.75' - light olive gray, (5Y 6/1), mild HCI reaction, very fine to fine gravel, up to 3/4"x1/2"  30% fines, nonplastic, mild to moderate HCI reafine to medium grained sand, 10% gravel-sized limestone fragments Begin Rock Coring at 49.0 ft bgs See the next sheet for the rock core log	OR OGY	SAMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
-						-		-
-						-		-
60								



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CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, NW/HW casing

				PIENT . Diethan D-50 5/N 252, mud rotary, NQ tools, NVV/		<u></u>	ORIENTATION : Vertical
WATER	LEVELS : 2 f	bgs (	on 03/	15/07 START : 3/14/2007 END : 3/	<u>21/20</u>	07 LOGGER : R. Bitely	
	_			DISCONTINUITIES	ניז	LITHOLOGY	COMMENTS
SZ€	9%		S	DESCRIPTION	1 💆	DOCK TYPE COLOR	
프 이 이	N. 4. 5.	(9)	되	2200.111	윽	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
989		ō	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ĮΣ	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ООШ		ď	⊡∟	THICKNESS, SORI ACE STAINING, AND HOTTINESS	S		
	49.0		0			Limestone	Switch to NQ rock coring
	1			49.55-49.65, 50.2-50.3' - Fracture zone (2),	╁	- 49.0-51.2' - dark yellowish brown,	tooling at 49.0', drive HW
50 -8.4	R1-NQ	40	>10	rough, undulating, with 1" openings —		(10YR 4/2), fine grained, extremely weak to very weak (R0 to R1), voids	casing to 49', seat casing in <6" rock, flush casing
-	2.5 ft 88%	42		50 AEL Machanical break or fracture 40 day	₽	- (<3/16") over 70% of surface except	with 3-7/8" tricone bit
	0070		2	50.45' - Mechanical break or fracture, 40 deg, rough, undulating, open <3/4"		from 49.65-50.2' where voids	R1: 5 minutes
1 -	51.5		NR	50.75, 50.9' - Bedding plane or mechanical		(<1/16") cover <20% of surface,	
-	31.3		INIX	break (2), <10 deg, rough, undulating, open	ш	- fossiliferous, cavities <1/2"x1/4" over	-
-	- 1		0	<1/2"	+	<15% of surface, trace organics No Recovery 51.2-51.5'	
l _	]					Limestone	_
			[		$\vdash$	51.5-56.4' - moderate yellowish	1
-	1		2	53.0' - Mechanical break or fracture, <10 deg,	t	brown, (10YR 5/4), fine grained,	1
-	R2-NQ			rough, stepped to undulating, tight	匚	<ul> <li>moderate to strong HCl reaction,</li> </ul>	-
-	5 ft	82	0	53.8' - Mechanical break or fracture, <10 deg,	$\vdash$	very weak to weak (R1 to R2), voids	1 -
	98%	-		rough, undulating, tight at fracture with	Ш	(<3/16") over 60-80% of surface, few cavities <1-1/2"x1" concentrated at	
55	]			associated cavity	$\vdash$	53.8', fossiliferous	1
-13.4	†		2	54.4' - Mechanical break —	₩	<u> </u>	-
-				55.0, 55.1' - Fractures, 35 deg, rough, undulating, tight	仜	-	D2: 10 minutes
	]		3	driddiating, tigrit	$\vdash$		R2: 10 minutes
	56.5			56.0, 56.2' - Mechanical break or fractures,	H		
-	00.0		NR/	<10 deg, rough, undulating, open <1/2"		No Recovery 56.4-56.5'	Water level at 1' below
-	1 1		>10	56.5-56.8' - Fracture zone, rough, undulating, gravel-sized (<1-1/2"x1"), open	╁	Limestone	ground surface at 17:30, -
_	1 1			57.0, 57.3, 57.5' - Fractures (3), 50-90 deg,	╀	56.5-60.4' - pale yellowish brown, (10YR 6/2), fine grained, very weak	end drilling on 03/14/07
				smooth, undulating, intersecting fractures,		to medium strong (R1 to R3), voids	
1 -	1		2	tight	Н	(<3/16") over 85% of surface,	Water level at 2' below
-	R3-NQ				+-	fossiliferous, trace organics,	ground surface on -
-	5 ft	48	3	58.7, 58.85, 59.5' - Bedding plane or	ш	extremely weak rock (R0) zones at	03/15/07 07:30
1 -	78%			mechanical break (3), smooth, undulating, tight	┢	56.5-56.8', 58.7', 58.85', 59.5', 59.75-60.0'	_
60			>10	58.95' - Mechanical break		39.73-00.0	
-18.4	1		/10	59.75-60.0' - Fracture zone, rough,	Ш		_
-	1			undulating, gravel-sized fragments	$t_T$	No Recovery 60.4-61.5'	R3: 16 minutes
-			NR	<1"diameter, open		-	-
1 _	61.5			61.3' - Bedding plane or mechanical break,	Ш		
				rough, undulating, broken along weak		Limestone	]
1 -	1		0	bedding planes, tight		- 61.5-66.45' - pale yellowish brown,	1
-					╀	(10YR 6/2), very fine to fine grained, weak to medium strong (R2 to R3),	-
-	.		1		仜	voids (<3/16") over 60-80% of	1 -
	j		Ľ	63.15' - Bedding plane, horizontal, rough,		surface at 61.5-61.9', 62.5-62.8',	
1 -	R4-NQ			undulating, tight	$\vdash$	63.5-65.1' and 65.4-66.3', organic	1
-	5 ft	98	0	63.5, 63.7, 63.95, 64.0, 64.05, 64.4, 64.45,	仜	- material as <1/4" thick laminations at	1 1
-	99%			65.2' - Mechanical break (8)	╀	63.0-65.2' over 20% of surface; very weak rock (R1) at 62.7-63.1',	-
65	]		0		┖	— 65.0-65.5' and 66.3', bioturbated with	_
-23.4						some secondary infilling at 65.5-66.3'	
_	1			-	$\vdash$	-	R4: 8 minutes
-	1		1	-	Ľ	-	-
-	66.5		NR/		仜	No Recovery 66.45-66.5'	-
I -	]		3	66.7, 67.5, 68.2, 68.5, 70.2, 70.3, 70.55' -	$\vdash$	- 140 Necovery 00.40-00.0	]
				Mechanical break or bedding plane (7), <10	片		]
1 -	1			deg, rough, undulating, <1/4" openings	╙	<b>-</b>	1
-	1		2	67.3' - Fracture, 70 deg and vertical, rough, stepped to undulating, tight	$\vdash$	<del> </del>	Driller's Remark: Slight
-				Stopped to undulating, tight		-	fluid loss in zone
	R5-NQ				$oldsymbol{oldsymbol{eta}}$		
							_



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CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, NW/HW casing

WATER LEVELS 2   16 box not off-1507   START 13/14/2007   END. 32/12/207   LOGGER R. Rilety   COMMENTS					IENT . Dietrich D-50 5/N 252, midd fotary, NQ tools, NVV/			ORIENTATION : Vertical
Description	WATER	LEVELS : 2 fl	bgs (	on 03/		21/20		
1	>	<u> </u>			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
1	SHE	. S.S.		S	DESCRIPTION	Ĭ	BUCK TABE CULUB	
1	표현호	N 4 8 1	9	ᄣ		윽		
1	I ∓≅ ¥	ONE S	<u>ေ</u>	달		B	WEATHERING, HARDNESS,	SMOOTHNESS CAVING ROD
1		RNA	Ø	RA		≥		
92%   3   69.45 - Fracture, 60 deg, smooth, undulating, 170   28.44   3   4   5   5   6   69.75   6   6   6   6   6   6   6   6   6	Δош				THERMESO, COM NOT COMMITTEE, AND THE THERMESO	S		
70. 28.4  71.5  7			62	0		Н		
28.4	70	92/0			69.45' - Fracture, 60 deg, smooth, undulating,	h		1
1				3	tight —		very weak to weak (R1 to R2) voids	_
1					-	₽	up to 3/16" over 80% of surface.	<b>               </b>
1.5				1			fossiliferous, trace laminated	R5: / minutes
1 72.35"- Bedding plane <10 deg, rough, undulating, 14" soil seam infili open 12" 72.6, 72.85, 72.95"- Bedding plane or mechanical break or bedding plane, 15 deg, rough, undulating, 19th 17.1-78.5 and 15.75 moderate plane information break or bedding plane, 15 deg, rough, undulating, 19th 17.1-78.5 and 75.76.10" close bedding plane, 15 deg, rough, undulating, 19th 17.1-78.5 and 75.76.10" close bedding plane, 15 deg, rough, undulating, 19th 17.1-78.5 and 75.76.10" close bedding plane, 15 deg, rough, undulating, 19th 17.1-78.5 and 75.76.10" close bedding plane, 15 deg, rough, undulating, 19th 17.57.57.50" close bedding plane, 15 deg, rough, undulating, 19th 17.57.57.50" close bedding plane, 15 deg, rough, undulating, 19th 17.57.57.50" close bedding plane, 15 deg, rough, stepped to undulating, 19th 17.57.57.50" close bedding plane, 15 deg, rough, stepped to undulating, 19th 17.57.57.50" close bedding plane, 15 deg, rough, stepped to undulating, 19th 17.57.57.50" close bedding plane, 15 deg, rough, stepped to undulating, 19th 17.57.57.50" close bedding plane, 15 deg, rough, stepped to undulating, 19th 17.57.57.50" close 15 deg, rough, stepped to undulating, 19th 17.57.57.50" close 15 deg, rough, stepped to undulating, 19th 17.57.57.50" close 15 deg, rough, stepped to undulating, 19th 17.57.57.50" close 15 deg, rough, 19th 17.		71.5		NR				1
1	-	71.5		IVIX	-	╙		-
Total Control of the Control of th	-			1 1	-	$\vdash$		_
Table   Tabl					70 051 Dadding plans (40 day rough			
Tr. 1.					72.35 - Bedding plane, < 10 deg, rough,	Ш		
R6-NC   St   St   St   St   St   St   St   S	-			5		$t_{T}$		-
New Note	-	B2.1.2			mechanical break (3), <10 deg, rough,	亡	<ul> <li>(10YR 6/2), very fine to fine grained,</li> </ul>	-
17.5 - Mechanical preak of veoling plane,   17.5 - Mechanical preak of veoling,	1 _		50	ا ر ا	undulating, tight	$oldsymbol{oldsymbol{oldsymbol{\sqcup}}}$		
75			50			$\vdash$		1
33.4	<b> </b>					亡		1
pen 1/4" 74.8-75.2 and 75.5-76.0" - Clay seams (2), smooth, undulating, extremely weak rock (RO) cones (RO) zones  R7.NO 80 -38.4  81.5  R8.NO 81.5  R8.NO 85.ft 89.76  R8.NO 85.ft 88.5  R8.NO 86.5  R8.S  R8.R.NO 86.5  R8.R.NO 86.7  R8.R.NO 86.5  R8.R.NO 86.7  R8.R.NO 86.6  R8.R.NO 86.7  R8.R.R.NO 86.7  R8.R.NO 86.7  R8.R.NO 86.7  R8.R.NO 86.7  R8.R.R.NO 86.7  R8.R.NO 86.7  R8.R.NO 86.7  R8.R.NO 86.7  R8.R.NO 86.7  R8.R.R.NO 86.7  R8.R.NO 86.7  R8.R.R.NO 86.7  R8.R.NO 86.7  R8.R.R.NO 86.7  R8.R.R.NO 86.7  R8.R.R.NO 86.7  R8.R.R.NO 86.7  R8.R.R.R.R.R.R.R.R.R.R.R.R.R.R.R.R.R.R				3		₽		-
Tell	-33.4					┢┼		1
Smooth, undulating, extremely weak rock (R0) zones   R7-NO (R0) zone				5	74.8-75.2 and 75.5-76.0' - Clay seams (2),			R6: 7 minutes
No Recovery 76.3-76.5  77.0, 77.3 - Fractures (2), 60 deg and 50-90 deg, rough, stepped to undulating, tight 77.95, 78.15, 78.3' - Fractures (3), <10 deg, rough, stepped to undulating, tight 78.65-79.0' - Fracture zone, rough, stepped to undulating, dissolution zone, angular to subangular gravel-sized fragments <1' diameter 79.2' - Fracture, vertical, smooth, undulating, tight 79.35, 79.5' - Fractures (2), rough, undulating, silt and/or clay sized infilling, tight 79.5-79.65' - Clay seam, 4-12' silt and/or clay sized infilling, tight 79.5-79.65' - Clay seam, 4-12' silt and/or clay sized infilling, tight 79.5-79.5' - Fracture zone, rough, undulating, silt and/or clay sized infilling, tight 81.5-81.7' - Fracture zone, rough, undulating, silt and/or clay sized infilling, tight 79.5-79.65' - Clay seam, 4-12' silt and/or clay sized infilling, tight 79.5-79.65' - Clay seam, 4-12' silt and/or clay sized infilling, tight 81.5-81.7' - Fracture zone, rough, undulating, sight and some point of silt of the state of	_	70.5			smooth, undulating, extremely weak rock	$\vdash$		1
R7-NO	-	76.5		NR.	(R0) zones	+		-
R7-NO 5 th 77%	_			2				_
R7-NO 5 ft 77% 28 >10								
R7-NQ   St.   St					deg, rough, stepped to undulating, tight	$\vdash$		
rough, stepped to undulating, tight 78.65-79.0' - Fracture zone, rough, stepped to undulating, dissolution zone, angular to subangular gravel-sized fragments <1" diameter 79.2' - Fracture, vertical, smooth, undulating, tight NR 81.5  81.5  R8-NQ 5 ft 10  R8-NQ 6 ft 10  R8-NQ 79.0'->90% voids <3/16", fossiliferous (molds, casts); 76.5-8.3 and 79.8-80.35' -80% voids <3/16", fossiliferous (molds, casts); 76.5-8.3 and 79.8-5-9.85'; 76.5-78.3' and 79.9-5-90% voids <3/16", fossiliferous (molds, casts); 76.5-8.3 and 79.8-5-90% voids <3/16", fossiliferous (molds, casts); 76.5-8.3 and 79.8-5-9.85' 76.5-R.3' and 79.9-9-90% voids <3/16", fossiliferous (molds, casts); 76.5-R.3' and 79.8-5-9.85' 76.5-R.9 and 79.8-5-9.85' 76.5-R.9 and 79.8-5-9.85' 76.5-R.9 and 79.8-5-9.85' 76.5-	-			3	77.95, 78.15, 78.3' - Fractures (3), <10 deg,			03/20/2007 set NW casing
80 -38.4	-	57.110				Н		
80 - 38.4			20	<b>\_10</b>	78.65-79.0' - Fracture zone, rough, stepped	ь		
subangular gravel-sized tragments <1   10			20	/10				
-38.4  -38.4  -38.4  -38.4  -38.4  -38.5  -38.5  -38.4  -38.5  -38.5  -38.5  -38.6  -3	-	,•				Ы		
tight 79.35, 79.5' - Fractures (2), rough, undulating, silt and/or clay sized infilling, tight 79.579.65' - Clay seam, 4-1/2" silt and/or clay sized infilling, Elastic Silt (MH) to Lean Clay - Elastic Silt (CL-ML) 79.85' - Bedding plane, smooth, undulating, tight 81.5-81.7' - Fracture zone, rough, undulating, tight 81.5-81.7' - Fracture zone, rough, undulating, gravel sized fragments <1/2" diameter, angular to subangular 82.25' - Fracture, 0-40 deg, rough, undulating, tight 83.6' - Bedding plane, <10 deg, rough, undulating, tight 83.5' - Bedding plane, <10 deg, rough, undulating, tight 83.5' - Bedding plane, <10 deg, rough, undulating, tight 83.5' - Bedding plane, <10 deg, rough, undulating, tight 83.5' - Fracture zone, horizontal and 20 deg, rough, undulating, fight 84.95' - Mechanical break 70.00, rough, undulating, fragmented rock, angular gravel sized fragments <1"diameter, open <2" sk.95' - Mechanical break, rough, undulating, open <1" sk.95' - Mechanical break, rough, undulating, angular gravel sized fragments <1"diameter, open <2" sk.95' - Mechanical break, rough, undulating, angular gravel sized fragments <1"diameter, open <2" sk.95' - Mechanical break, rough, undulating, angular gravel sized fragments <1"diameter, open <2" sk.95' - Mechanical break, rough, undulating, angular gravel sized fragments <1"diameter, open <1/2" sk.95' - Fracture zone, rough, undulating, angular gravel sized fragments <1"diameter, open <2" sk.95' - Mechanical break, rough, undulating, angular gravel sized fragments <1"diameter, open <1/2" sk.95' - Fracture zone, rough, undulating, angular gravel sized fragments <1"diameter, open <1/2" sk.95' - Fracture zone, rough, undulating, angular gravel sized fragments <1"diameter, open <1"colored to the surface and sk.95' sk.94' sk.94's sk.9-85.15' and sk.65-84.8', 84.9-85.15' and sk.65-				10				
NR 81.5	-50.4					┢		
## 1.5 ##					79.35, 79.5' - Fractures (2), rough.	$\vdash$		
79.5-79.65' - Clay seam, 4-1/2" sitt and/or clay sized infilling, Elastic Silt (MH) to Lean Clay (CL), moderate plasticity, low dilatancy, strong HCl reaction 79.85' - Bedding plane, smooth, undulating, tight 81.5-81.7' - Fracture zone, rough, undulating, gravel sized fragments <1/2" diameter, angular to subangular 83.6' - Bedding plane, <10 deg, rough, undulating, tight 84.0' - Mechanical break 84.6' - Fracture zone, horizontal and 20 deg, rough, undulating, tight 20 deg, rough, undulating, fragmented rock, angular gravel sized fragments <1"diameter, open <2" 84.95' - Mechanical break, rough, undulating, open <1" 85.6-86.65' - R85.95' - Fracture zone, horizontal and 20 deg, rough, undulating, angular gravel sized fragments <1"diameter, open <2" 86.5' - Fracture zone, rough, undulating, angular gravel sized fragments <1"diameter, open <1/2" at 88.6-86.65' - R86.65' - R86.65	1 -	01 5		INE	undulating, silt and/or clay sized infilling, tight			
Section   Sect	-	01.5			79.5-79.65' - Clay seam, 4-1/2" silt and/or	<del>                                     </del>		-
R8-NQ 5 ft 90%	-			>10		₽	, ,	-
R8-NQ 76 1 gravel sized fragments <1/2" diameter, angular to subangular 82.25' - Fracture, 0.40 deg, rough, undulating, open <1"   St. 3.4   Sed. 5   Sedding plane, smooth, undulating, gravel sized fragments <1/2" diameter, angular to subangular 82.25' - Fracture, 0.40 deg, rough, undulating, open <1"   Sc. 10   Sedding plane, <10 deg, rough, undulating, tight   Sed. 5   Sed. 0' - pale yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids (<3/16") over 60-80% of surface at 81.5-83.0' and 84.5-86.0', fossiliferous (molds <1/2"x1/4"), dissolution cavities up to 2"x1/2" at 82.3', 84.65-84.8', 84.9-85.15' and 9cpen <2"   84.95' - Mechanical break, rough, undulating, open <1/2"   Sec. 5   Sec. 5   Sec. 5   Sec. 5   Sec. 6.65'   Sec. 6				'˘				
R8-NQ 5 ft 90% 85	1 -					<b> </b>		1
R8-NQ 5 ft 90% 76 1 gravel sized fragments <1/2" diameter, angular to subangular 82.25' - Fracture, 0-40 deg, rough, undulating, open <1" states of the state of the states of the state	-			0	tight -	1	No Recovery 80.35-81.5'	-
angular to subangular 82.25' - Fracture, 0-40 deg, rough, undulating, open <1"  >10 86.5  A3.4  Sc-1 collected at 84.95- 86.5  A8.6	-	D0 N0				$\Box$		-
85 -43.4   Signature   Signatu	1 _		76	,	gravel sized fragments <1/2" diameter,	┢		
85 -43.4  >10  >10  85.5  NR  86.5  NR  >10  NR  86.5  86.5  86.5  NR  >10  NR  86.5  NR  SC-1 collected at 84.95- 86.0' R8: 9 minutes			, 0	'	angular to subangular 82 25' - Fracture, 0-40 deg, rough			
S10   83.6' - Bedding plane, <10 deg, rough, undulating, tight   Sc-1 collected at 84.95-   Sc-1 col		55,3				仜		-
undulating, tight  84.0' - Mechanical break 86.5 NR  NR  20 deg, rough, undulating, fragmented rock, angular gravel sized fragments <1"diameter, open <2" 84.95' - Mechanical break, rough, undulating, open <1/2"  86.75-86.95' - Fracture zone, rough, undulating, angular gravel sized fragments  10 NR  10 NR  11 to R3), voids (<3/16") over 60-80% of surface at 81.5-83.0' and 84.5-86.0', fossiliferous (molds <1/2"x1/4"), dissolution cavities up to 2"x1/2" at 82.3', 84.65-84.8', 84.9-85.15' and 85.6-86.65'  86.0' R8: 9 minutes  86.0' R8: 9 minutes	_43 <u>4</u>			>10		╀		SC-1 collected at 84 95-
84.0' - Mechanical break 84.65-84.8' - Fracture zone, horizontal and 84.5-83.0' and 84.5-86.0', fossiliferous (molds <1/2"x1/4"), dissolution cavities up to 2"x1/2" at 82.3', 84.65-84.8', 84.9-85.15' and 9pen <2" 84.95' - Mechanical break, rough, undulating, open <1/2" 86.75-86.95' - Fracture zone, rough, undulating, angular gravel sized fragments					undulating, tight	++	to R3), voids (<3/16") over 60-80% of	
86.5 NR 20 deg, rough, undulating, fragmented rock, angular gravel sized fragments <1"diameter, open <2" 82.3', 84.65-84.8', 84.9-85.15' and 85.6-86.65' 84.95' - Mechanical break, rough, undulating, open <1/2" 0 86.75-86.95' - Fracture zone, rough, undulating, angular gravel sized fragments				0				R8: 9 minutes
20 deg, foligh, inidiating, fragments <1"diameter, angular gravel sized fragments <1"diameter, open <2"   82.3", 84.65-84.8', 84.9-85.15' and   85.6-86.65'   84.95' - Mechanical break, rough, undulating, open <1/2"   0   86.75-86.95' - Fracture zone, rough, undulating, angular gravel sized fragments   0   0   0   0   0   0   0   0   0	1 -	86.5		NR		$\vdash$		1
>10 open <2"	-	00.0		H		t'		-
84.95' - Mechanical break, rough, undulating, open <1/2"  0 86.75-86.95' - Fracture zone, rough, undulating, angular gravel sized fragments	-			>10				-
open <1/2"  86.75-86.95' - Fracture zone, rough, undulating, angular gravel sized fragments						┢		
undulating, angular gravel sized fragments	1				open <1/2"	Ľ		1
	1 -			0		Œ	F	-
71-112 diameter, 2-112 open	-	DO NO				╀	-	-
		K9-NQ		$\sqcup$	TETIZ GIATHELET, Z-1/Z UPET	Ľ		
						1		
						L		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-01	SHEET	6	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723879.2 N, 457603.8 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, NW/HW casing

				IENT . DIELIICH D-30 3/N 232, IIIuu Tolaiy, NQ 10015, NVV			
WATER	LEVELS: 2 ft	bgs	on 03/	15/07 START : 3/14/2007 END : 3/	21/20	07 LOGGER : R. Bitely	
	_			DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	DOCK TYPE COLOR	
ON PER	₹ <u>₹</u> ₹	<u> </u>	FRACTURES PER FOOT	DEGOTAL HOLY	<u></u>	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
ASE		(%) <sub>Q</sub>	ĮΣŏ	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	ğ	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
Բ쥬핑		Ø	AC R F	PLANARITY, INFILLING MATERIAL AND	ξ	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	898	ď	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Š	CHARACTERISTICS	BROLO, TEOLINEOGETO, ETO.
	5 ft	80	1	89.0' - Bedding plane, <10 deg, rough,		Limestone	
-	98%			undulating, open 1/4"	╂	<ul> <li>83.0-84.5' - mild to moderate HCl</li> </ul>	_
90			0	_	┵	reaction, mottled with zones of	
-48.4			"		Н	bioturbation having a secondary infill	
-						of a very fine, medium strong rock	R9: 11 minutes
_			2	00 05' Badding plans, barizontal amouth	$\bot$	(R3) matrix, voids (<3/16") over 30%	-
	91.5			90.95' - Bedding plane, horizontal, smooth, undulating, open <1/4"	$\vdash$	of surface, secondary infilling of	
_			NR.	91.25' - Mechanical break or bedding plane,	1	bioturbated zone consisting of     20-30% of surface, trace fossil molds	
-			1	15 deg, rough, undulating, tight		No Recovery 86.0-86.5'	-
l _				91.6' - Bedding plane, horizontal, smooth,	<b></b>	Limestone	_
				undulating, tight	$\vdash$	86.5-87.05' - moderate yellowish	
-			0	92.9' - Mechanical break	T	brown to very light gray, (10YR 4/2 to	-
-	B12112				亡	<ul> <li>N8), very fine to fine grained,</li> </ul>	-
	R10-NQ	82	3	03.95.03.05! Erecture ==== =====	ш	extremely weak to very weak (R0 to	
1 -	5 ft 98%	02		93.85-93.95' - Fracture zone, rough, undulating, 3 fractures, open <1-1/2"	$\vdash$	R1), grayish blue mottling (5PB 5/2),	1
-	30 /0			undulating, 3 haddines, Open < 1-1/2	+	voids (3/16") over 60-80% of surface	-
95			1	_	$\perp$	from 84.5-86.0' and fossiliferous with	
-53.4			'	05 01 5	H	trace organics 87.05-89.15' - Same as 86.5-87.05'	
-				95.3' - Fracture, 75 deg, smooth, undulating,	╨	except very light gray (N8) and	R10: 16 minutes
-			4	tight 95.85-95.9' - Clay seam, horizontal, smooth,	╁┰	grayish blue (5PB 5/2) mottling, voids	-
	96.5			undulating, 3/4" clay infilling, Fat Clay (CH),		(3/16") over 50-60% of surface,	
			NR.	medium gray (N5), moist, soft, high plasticity		fossiliferous (microfossils)	1
-			1	96.05, 96.35' - Mechanical break or bedding	╂	89.15-90.7' - fine grained, very weak	-
_				plane (2), <10 deg, rough, undulating, tight		(R1), voids (<3/16") over 30-50% of	_
				96.85, 97.55' - Bedding plane, <10 deg,		surface, moderately fossiliferous	
-			2	rough, undulating, tight	1_	90.7-91.4' - Same as 86.5-87.05'	SC-2 collected at 98.05-
-				97.05, 99.0, 99.75, 101.05, 101.4' -	╀┸	except no mottling	99.0'
I _	R11-NQ 5 ft	98	0	Mechanical break (5)	$\perp$	No Recovery 91.4-91.5'	_
	100%	90	"	98.0' - smooth, undulating, <1/2" silt and/or		91.5-96.4' - moderate yellowish	
	1 .00,0			clay sized infilling	╙	brown to yellowish gray, (10YR 5/4 to	-
100_			0	_	╁┬	— 5Y 7/2), very fine to fine grained,	
-58.4						extremely weak to weak (R0 to R2)	
_						91.55-91.85' - fine grained, verv	R11: 8 minutes
-			0		╁	<ul><li>weak (R1), voids (&lt;3/16") over</li></ul>	
1 -	101.5				$\vdash$	30-50% of surface, fossiliferous	_
			,	101.55, 102.65, 103.75' - Bedding plane or		91.85-94.6' - moderate HCl reaction,	
1 -			1	fractures (3), horizontal, smooth, undulating,	L	- voids (<3/16") over 60-80% of	1
1 -				tight	╨	surface, moderately fossiliferous	-
			1		$\vdash$	(molds up to 1/2" x 1/4"), few cavities <a></a> <1/2" diameter, trace organics	
1 -			'			94.6-96.4' - strong HCl reaction,	]
-	R12-NQ				仜	gradual transition to >30% voids up	
1 -	5 ft	86	1		$\vdash$	to 1/16", 1/4" diameter cavity with	-
	96%			104.0, 104.85' - Mechanical break	$\vdash$	medium light gray (N6) clay infill	
405	]				LТ	No Recovery 96.4-96.5'	1
105 <u> </u>			0	_	匚	Limestone	
-00.4					$oldsymbol{\perp}$	96.5-101.5' - yellowish gray, (5Y 7/2),	_
1			<b>~</b> 40	105.5-105.6' - Fracture zone, rough,	$\vdash$	very fine to fine grained, strong HCI	R12: 3 minutes
1 -			>10	undulating, gravel sized fragments, <1"	Ľ	reaction, extremely weak to very	-
-	106.5		NR,	diameter	$\perp$	weak (R0 to R1), voids (<3/16") over 70-80% of surface, moderately	-
1					$\vdash$	fossiliferous (molds <1/2"x1/4"), trace	
1 -			0		╁	organics; 1/2" silt seam at 98.0', slow	1
-					一	to fast dilatancy, low plasticity,	-
1 _			1		$\Box$	_ carbonate material	]
			'		$\vdash$		
-	R13-NQ				$\top$	†	1
					Ë		_
					1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-01	SHEET	7	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723879.2 N, 457603.8 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, NW/HW casing

WATER	LEVELS : 2 f	bgs o	on 03/	5/07 START : 3/14/2007 END : 3/	21/200	7 LOGGER : R. Bitely	
>∩⊋	(%			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	I.R.U.	R Q D (%)	TO:	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
ER.	ORE ENG	۵D	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
Δош	ე <u>ე ღ</u> 5 ft	<u>~</u> 70	<u>⊾ ∩</u>		S		
	100%	70		108.65' - Fracture, 75 deg, smooth, undulating, tight	凵	<b>Limestone</b> - 101.5-106.3' - yellowish gray, (5Y	_
110_			4	109.1, 109.15, 109.25' - Fractures (3), 90, 30, _	Н	7/2), very fine to fine grained, strong	
-68.4			·	50 deg, smooth to rough, undulating, intersecting fractures from 108.7-109.5'	Д	HCl reaction, extremely weak to very weak (R0 to R1), voids (<1/16") over	_
			3	109.65' - Fractures, 65 deg and 70 deg,	Н	50% of surface, few cavities up to	R13: 10 minutes
	111.5		3	rough, undulating, tight 110' - Fracture, 75-85 deg, rough, undulating,		1/2"x1/4", poorly to moderately fossiliferous; 105.6-106.05' weak	
1 7				tight, intersecting	世	rock (R2) zone, voids (<3/16") over	_
			0	110.5-110.65' - Fracture zone, 50 deg and 70	ш	70% of surface, moderately	-
				deg, rough, undulating, open <1-1/2"	ш	<ul> <li>fossiliferous, moderate HCl reaction at 105.6-106.05'</li> </ul>	-
-			0		+	No Recovery 106.3-106.5'	-
-	R14-NQ			113.35, 114.0, 114.2, 115.2, 116.25, 116.5' -	$\Box$	Limestone	-
-	5 ft	100	0	Mechanical break (6)	世	106.5-111.5' - moderate yellowish brown to yellowish gray, (10YR 5/4 to	SC-3 collected at 114.2-
1 -	100%				₽₽	5Y 7/2), very fine to fine grained,	115.2'
115_			0	_	ш	strong HCl reaction, very weak (R1), voids (<3/16") over 60-80% of	_
-73.4					╁┼	surface, moderately to highly	
			0		月	fossiliferous (molds <1/4" diameter)	R14: 7 minutes
	116.5		Ŭ			concentrated at 106.5-107.7' and 110.0-110.3', surface iron staining at	_
			1	116.6' - Bedding plane, horizontal, smooth,	Ш	106.8', 107.8' and 109.5'	
			'	undulating, tight	Ш	111.5-116.5' - yellowish gray, (5Y 7/2), very fine to fine grained, strong	_
					${\mathbb H}$	HCl reaction, very weak (R1), 40%	-
1 7			0		Ħ	voids to <1/16", poorly to moderately fossiliferous (molds <1/16"), iron	-
1 -	R15-NQ				⇈	staining at 113.8', 114.6' and 115.7'	-
1 -	5 ft	92	0	118.85, 119.85' - Mechanical break (2)	╂┼╂	116.5-119.0' - yellowish gray, (5Y	-
l	97%				┲	7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1	-
120 -78.4			0	_	丗	— to R2), voids (<3/16") over 60% of	
''-'				120.5-120.6' - Fracture zone, 25 deg and	+	surface, poorly to moderately fossiliferous (molds <1/2"x1/4")	R15: 9 minutes
-			2	horizontal, rough, undulating, intersecting,	Ħ	- 119.0-121.35' - Same as	K15. 9 minutes
	121.5		NR.	open <1"	₽	116.5-119.0' except 80% voids up to	_
			1	121.9' - Bedding plane, horizontal, smooth,	耳	3/16", few cavities up to 1/2" diameter, highly fossiliferous (molds	
				undulating, tight	Ш	<1/2")	] _
]			0	<b>5</b> . <b>5</b>	Щ	No Recovery 121.35-121.5' Limestone	
1			U		口	121.5-122.65' - Same as	1
1	R16-NQ				14	119.0-121.35'	_
	5 ft 100%	84	0		口	<ul> <li>122.65-124.0' - pale yellowish brown, (10YR 6/2), very fine to fine grained,</li> </ul>	
125	10070				丗	very weak (R1), voids (<1/16") over	· -
-83.4			0	<del>-</del>	╂┼╂	— >50% of surface, poorly fossiliferous (molds up to 1/4" diameter), few	-
					╁╬	cavities up to 1/2"x1/4"	R16: 6 minutes
-			>10	125.75-126.5' - Fracture zone, rough,	╂┼╂	124.0-126.5' - Same as	-
	126.5			undulating, gravel sized fragments <3"x1-1/2"	郉	122.65-124.0' except voids up to 3/16" over 60-80% of surface.	-
			2		丗	extremely weak rock (R0), highly	-
				127.25, 127.45, 127.7, 131.3' - Bedding	$\Box$	fossiliferous below 125.75', friable	_
			1	plane, horizontal, smooth, undulating, tight	岸	_	] _
			'		╁┼┨	_	
	R17-NQ			128.7, 129.0' - Mechanical break (2)	Ш		
				,			



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-01	SHEET	8	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723879.2 N, 457603.8 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, NW/HW casing

WATER	LEVELS : 2 f	bgs o	on 03/	15/07 START : 3/14/2007 END : 3/	21/20	07 LOGGER : R. Bitely	
≥∩ ⊊	(%)			DISCONTINUITIES	စ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
130 -88.4	5 ft 100%	87	0	- - -		Limestone - 126.5-131.5' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 - to R2), voids (<3/16") over 60% of	-  R17: 5 minutes
-	131.5		0	- -		surface, poorly to moderately fossiliferous, few cavities <1/2"  diameter, trace secondary infill of cavities, laminated bedding at 127.2',  127.85' and 128.95'	- - -
-			0	133.05, 134.0, 135.2' - Mechanical break (3)		- 131.5-136.5' - yellowish gray, (5Y 7/2), very fine to fine grained, very weak to medium strong (R1 to R3), - 131.5-132.95' - voids <3/16" over	SC-4 collected at 133.05- 134.0'
135	R18-NQ 5 ft 100%	100	0	-		40% of surface, poorly fossiliferous (molds <1/2" diameter); 132.95-136.5' - voids up to 3/16" over 70% of surface, highly fossiliferous	-
-93.4 -93.4	136.5		0			(molds <1/2"), molds over 30-50% surface	R18: 10 minutes -
-	136.5		1	- 137.5' - Bedding plane, horizontal, smooth,		136.5-141.2' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine to fine grained, strong HCI reaction, very weak to medium	- - -
-	R19-NQ 5 ft	86	2	undulating, tight - 138.05, 138.45, 138.6' - Bedding plane, <10 deg, rough, undulating, tight		- strong (R1 to R3), laminated bedding, 30-60% voids up to 3/16", poorly to moderately fossiliferous - (molds <1/2"x1/4"), surface iron	-
140_ -98.4	94%		0	- -		staining at 136.7', 137.7', 138.2', 139.1' and 140.5', laminated throughout	-
-	141.5		>10 NR	140.9-141.2' - Fracture zone, rough, undulating, gravel sized fragments <2"		- - No Recovery 141.2-141.5' Limestone	R19: 8 minutes
-			>10	141.6-142.0' - Bedding plane (>10), <10 deg, smooth to rough, undulating, open <1/4" 142.0-142.65' - Fracture zone, rough, undulating, angular gravel-sized fragments		<ul> <li>141.5-145.0' - moderate yellowish</li> <li>brown to yellowish gray, (10YR 5/4 to 5Y 7/2), very fine to fine grained,</li> <li>141.5-142.0' - moderate yellowish</li> </ul>	- - -
-	R20-NQ 5 ft 70%	23	4	<1-1/2" diameter 142.9, 143.3, 143.65, 144.15, 144.25, 144.5, 144.7' - Fractures (8), <10 deg, rough, undulating, <1/2" openings		brown, very weak to weak rock (R1-R2), voids (<3/16") over 70% of surface, moderately fossiliferous, trace organics, trace laminated	-
145 -103.4 -			>10 NR	144.7-145.0' - Fracture zone, rough, undulating		bedding; — 142.0-145.0' - voids up to 3/16" over 50% of surface, medium strong rock (R3), highly fossiliferous (molds - <1"x1/2"), cavities <1.5"x1", several	Core barrel malfunction from 144.7-145.0' due to rock fragments wedged in bit
-	146.5		2	146.6' - Bedding plane, <10 deg, rough, undulating, open <1/4"		cavities with secondary mineral infill, heavily bioturbated  No Recovery 145.0-146.5'	R20: 10 minutes -
-	R21-NQ		1	146.8, 147.8' - Bedding plane (2), horizontal, smooth, undulating, tight		-	-
	1.2				Ī		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-01	SHEET	9	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723879.2 N, 457603.8 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DISCONTINUITIES  LITHOLOG  ROCK TYPE, O  MINERALOGY, T  WEATHERING, H  AND ROCK TYPE, O  MINERALOGY, T  WEATHERING, H  AND ROCK  PLANARITY, INFILLING MATERIAL AND  THICKNESS, SURFACE STAINING, AND TIGHTNESS  CHARACTERI  CH	COLOR, EXTURE, ADDNIESE FLUID LOSS, CORING RATE AND
DESCRIPTION  ROCK TYPE, C MINERALOGY, T WEATHERING, HA DESCRIPTION  ROCK TYPE, C MINERALOGY, T WEATHERING, HA AND ROCK N  AND ROCK TYPE, C MINERALOGY, T WEATHERING, HA AND ROCK N  AND ROCK N  WEATHERING, HA AND ROCK N  AND ROCK N  WEATHERING, HA AND ROCK N  AND ROCK N  WEATHERING, HA AND ROCK N  MINERALOGY, T WEATHERING, HA MINERALOGY, T WEATHERING, H MINERALOGY, T WEAT	EXTURE, ADDNESS FLUID LOSS, CORING RATE AND
TYPE   REPORT OF THE PROPERTY OF THE PROPE	FLUID LOSS, CORING RATE AND
토밭집   풀엉엉   끊   옷료   PLANARITY, INFILLING MATERIAL AND   풀   AND ROCK M	
【 병교급 】 용픽뿐	
	101100
5 ft 80 1 148.95' - Bedding plane, horizontal, rough, Limestone undulating, open <1/4" 146.5-150.8' - modera	te vellowish
150 brown to yellowish gra	y, (10YR 5/4 to
-108.4 5y 7/2), very fine to fine to fine to moderate HCl react	ion laminated
bedding, 146.5-148.9'	- weak to R21: 13 minutes
151.5 NR medium strong rock (F	R2-R3), voids
increase to 80% from	148.3-148.9' SC 5 collected 151.95
151.85° - Bedding plane, norizontal, rough, 148.9-150.8' - very we undulating, tight voids (up to 3/16") over	eak rock (RT), 152 g
surface, moderately for	
(casts) concentrated a	
R22-NQ 153.45-153.55 - Clay seam of bedding Limestone	51:9
- 5 ft   92   0   plane, horizontal, smooth, undulating, 5/8" silt   151.5-153.45' - Same and/or clay sized infilling, tight   151.5-150.8' except vs	
155   Sitty Sand (SM)	Ely Weak (KT)
-113.4 153.45-153.55' - wet, l	loose, silt has
rapid dilatancy, 50% fi	
2   smooth undulating tight	
156.5 Limestone	ollowish brown
3 156.7, 156.8, 156.9' - Bedding plane (3), <10 153.55-156.5' - pale you deg, smooth, undulating, tight to yellowish gray, (10)	/R 6/2 to 5Y
- $        -$	
moderate to strong H0 medium strong (R3), 5	
158.35, 158.6, 159.7' - Mechanical break (3) - up to 3/16", poorly to r	moderately
5 ft 92 0	
- 100% - cavities <1/2"x1/4", 1 I	arge
160 -118.4 0 (3/4"x1/2") cavity at 15 156.5-161.5' - pale yel	66.4'
- (10YR 6/2), very fine t	o fine grained,
1 160.65' - Bedding plane, <10 deg, smooth, moderate to strong HC undulating, tight weak to very weak (R2	
undulating, tight weak to very weak (R2 voids up to 3/16", mod	lerately _ Water level at 5' below
fossiliferous (molds 3/	
diameter), trace organ	iics, tracc
carbonate material at	
and 160.5', medium st lense at 158.7-159.7',	
1   1   1   1   1   1   1   1   1   1	S1.5 ft has on
3/21/2007	71.0 1. 593 011
1 1 1 1	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-02	SHEET	1	OF	13	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ and NWJ rods, 6 tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 1.5 ft bo	gs on 03/2	22/07	START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely
				STANDARD	SOIL DESCRIPTION COMMENTS
AND Z	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	070
ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
41.6	0.0			(14)	Poorly Graded Sand With Organics (SP) "Water level is based on Ground Water
-		1.1	SS-1	2-2-4	\ \ 0.0-0.2' - grayish black, (N2), moist, loose, very fine to \ - \ Monitoring at LNP site (FSAR Table - 2.4.12.08)"
-	1.5			(6)	\textstyle \nonpilastic fines, 20% fine organics \textstyle \textstyle \textstyle \textstyle \text{Water level at 1.5' below ground surface}
-	1.0				Poorly Graded Sand (SP) 0.2-1.1' - medium light gray, (N6), moist, loose, very  SS-1 collected with hammer only, hammer stem is AWJ rod, NWJ used below SS-1
					\fine to fine grained, sand is silica, trace nonplastic \ \ \ 6" tri-cone roller bit used with mud rotary to
					fines, 10% organics and roots open bore hole, rapid drilling from 0-10' below ground surface
_					
_					
_					
5 36.6	5.0				Silty Sand (MM)
- 30.0				3-4-7	Silty Sand (SM) 5.0-5.9' - light olive gray, (5Y 6/1), wet to moist,
-		0.9	SS-2	(11)	medium dense, slow dilatancy, no HCl reaction, fine sand, 22% low plasticity fines
-	6.5				-
-					
-					
-					
-					
-					<b>1</b>
10	10.0				
31.6	10.3	0.3	SS-3	50/3 (50/3") /	Silt With Sand (ML)  Silt With Sand (ML)  Extremely slow drilling rate 10.0-14.5'  -
_				(00/0)	medium plasticity, rapid dilatancy, mild to moderate
_					HCl reaction, 25% sand sized grains, trace iron-rich   concretions at 10.25', carbonate material with some   -
-					silica grains (possibly slough)
-					-
-					
-					
-					-
15	15.0				Rapid drilling 14.5-20'
26.6	10.0				Silt (ML)
_		1.3	SS-4	21-30-25 (55)	15.0-16.3' - moderate yellow, (5Y 7/6), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction,
	16.5			(00)	14% fine to medium sand sized grains, carbonate
_					_
-					
-					
-					
-					
20					-



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-02	SHEET	2	OF	13

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ and NWJ rods, 6 tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 1.5 ft bo	gs on 03/2	22/07	START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely
>00				STANDARD	SOIL DESCRIPTION COMMENTS
N (#	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH BI		RECOVE			MOISTURE CONTENT, RELATIVE MINISTRY OR  MOISTURE CONTENT, RELATIVE MINISTRY OR  DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
21.6	20.0	0.1	SS-5	50/2.5	Limestone Fragments
				(50/2.5")	\[ \ \ 20.0-20.1' - grayish yellow, (5Y 8/4), mild HCI \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
l _					voids to 1/16"  Rapid drilling with intermittent dense zones 21-35'
-	-				
-	-				
-	_				
-					
-					<b> </b>
25	25.0				
16.6	25.4	0.4	SS-6	50/5 (50/5")	Silt With Interbedded Limestone Lenses (ML)  25.0-25.4' - dark yellowish orange, (10YR 6/6), wet,
				(50/5)	hard, nonplastic, rapid dilatancy, mild to moderate
_					HCl reaction, limestone lenses <1/2" thick, voids /
_	-				-
-					
-					
-	-				
-					<b>†  </b>
30	30.0				<b>1</b>
11.6				15-30-50/3	Silty Sand (SM) 30.0-31.0' - dark yellowish orange, (10YR 6/6), wet,
_	]	1.0	SS-7	(80/9")	very dense, fine to coarse grained, moderate HCl
_	31.3				reaction, 49% nonplastic fines, 1" thick limestone lense at 30.4', few limestone lenses <1/4" thick
_	-				\interbedded throughout, carbonate derived
-	-				
-					
-					
-	1				
35	35.0				1 1
6.6		0.8	SS-8	15-50/2.5	Silty Sand (SM) 35.0-35.8' - Same as 30.0-31.0' except a few siltier  Moderate to heavy chatter increasing with depth, moderate to slow drilling 35-40'
-	36.0	0.0	000	(65/11.5")	lenses <1/2" thick, no limestone lenses
-					
-	-				
-					
-	1				
-	-				
-	1				<b> </b>
40					
1					1



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-02	SHEET	3	OF	13

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ and NWJ rods, 6 tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 1.5 ft bo	gs on 03/2	22/07	START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely
>00				STANDARD PENETRATION	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	- ' '	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH B		RECOVE		011 011 011	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
DEP SUR ELE			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MIINERALOST
1.6	40.0	0.1	\_SS-9_/	50/1 (50/1")	Limestone Fragments  40.0-40.1' - yellowish gray to light olive gray, (5Y 7/2  Drilling stops at 17:30 on 03/22/2007  Water/mud level 0.5' below ground surface
_				(00/1)	to 5Y 5/2), moderate to mild HCl reaction, fragments \<1-1/2" x 1/2" in size \\
-					Continue drilling from 40' with mud rotary NWJ rod and 6" tri-cone bit at 08:00 on
-					- 03/23/2007 -
-					Extremely slow drilling, light to moderate chatter 40-44'
-					
-					1 1
					44.0-45.0' Drill rate increases slightly 40-44'
45	45.0				
-3.4				37-50-48	Sandy Silt (ML) 45.0-46.3' - light olive gray, (5Y 5/2), wet, hard,
-		1.3	SS-10	(98)	nonplastic, rapid dilatancy, mild to moderate HCl reaction, 48% fine to coarse grained sand
-	46.5				- Todasion, 10 % limb to obdied grained darid
-					
_					<b>- 1</b>
_					11
					] [
_					
50 -8.4	50.0				Sandy Silt With Gravel (ML)
-		1.3	SS-11	12-24-30	50.0-51.3' - moderate olive brown, (5Y 4/4), wet, hard,  -┃┃┃┃           -
-	51.5	1.5	00-11	(54)	nonplastic, rapid dilatancy, moderate to strong HCl reaction, 30% sand sized grains, 20% gravel sized
_	31.3				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
_					
					] [
_					
-					-
55 <u> </u>	55.0	0.0	00.40	50-50/3	Sandy Silt With Gravel And Limestone (ML)  HW casing set to 55', clean out casing with
-	55.8	0.8	SS-12	(100/9")	55.0-55.5' - Same as 50.0-51.3' except moderate yellowish brown, (10YR 5/4), limestone fragments
_					\\<1-1/2" x 1/2" thick \/ \  Rock coring begins at 56.5', no sampling
					Silt (ML) 55.5-55.8' - moderate yellowish brown, (10YR 5/4),
_					wet, hard, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 10-15% very fine to fine sand
-					sized grains, carbonate derived
-					Begin Rock Coring at 56.5 ft bgs See the next sheet for the rock core log
-					<del> </del>
60					
					11



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BORING NUMBER:

A-02 SHEET 4 OF 13

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

SELOW SE AND ION (ft)				DISCONTINUITIES			
SELO SE ANI SE ANI SON (f	_ ⊔ ©			DISCONTINUITIES	စ္က	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
   60 -18.4	56.5 R1-NQ 5 ft 86%	74	1 1 2 2 0 NR	57.1' - Fracture, 30 deg, smooth, undulating, <1/4" open  58.35, 58.5, 58.75' - Fractures (3), <10 deg, rough, undulating, <1/4" open 58.95' - Mechanical break  59.85' - Fracture (2), 60 deg and 30 deg, smooth, undulating, intersecting fractures		Limestone  56.5-60.8' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, mild to moderate HCI reaction, very weak to medium strong (R1 to R3), voids (<3/16")  over 70% of rock surface from 56.5-58.2', voids (<3/16") variable from trace to 50% of rock surface from 58.2-60.8', trace organics, moderately fossiliferous, few molds/casts <1/4", many molds/casts <3/16" 56.5-58.2; 58.9-60.5' - weak to medium strong (R2 to R3)	R1: 13 minutes
- - - - 65 -23.4	R2-NQ 5 ft 90% 66.5	76	2 >10 1 2 0 NR	61.7' - Fracture, <10 deg, rough, undulating, <1/2" open 62.1' - Fracture, 15 deg, rough, undulating, <1" open 62.6' - Fracture, 70 deg, smooth, undulating, tight 62.9' - Fracture, <10 deg, rough, undulating, <1-1/2" open 63.7' - Fracture, <10 deg, rough, undulating, <1" open 64.0, 64.5' - Mechanical break (2) 64.7' - Fracture, <10 deg, rough, undulating, tight 65.35' - Fracture, <10 deg, smooth, undulating, tight		58.2-58.9; 60.5-60.8' - very weak (R1)  No Recovery 60.8-61.5' Limestone 61.5-66.0' - moderate HCl reaction, extremely weak to medium strong (R0 to R3), trace organics throughout, organic lense at 62.9'  <1-1/2" thick (laminated), voids (<3/16") over 70% of surface from 61.7-63.7', voids (<1/16") over 20% of surface from 63.7-66.0', moderately fossiliferous with molds <3/16", few cavities (1" x 1/2")	R2: 11 minutes
	R3-NQ 5 ft 98% 71.5	98	0 0 0 0			61.5-61.7; 62.9-63.7' - extremely weak to very weak (R0 to R1) 61.7-62.9; 64.2-66.0' - weak to medium strong (R2 to R3) No Recovery 66.0-66.5 Limestone 66.5-71.4' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate HCI reaction, very weak to medium strong (R1 to R3), trace laminated bedding, trace organics, voids (<3/16") variable for 0-50% of rock surface, poorly fossiliferous 66.5-68.4, 70.0-71.5' - very weak	R3: 12 minutes
	R4-NQ 5 ft 95% 76.5	84	0 0 1 0 0	72.85' - Fracture, 65 deg, rough, undulating, tight  74.0' - Mechanical break 74.35' - Fracture, 15 deg, smooth, undulating, tight		68.4-70.0' - weak to medium strong (R2 to R3) No Recovery 71.4-71.5' Limestone 71.5-72.3' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), voids (<3/16") over 40-50% of rock surface, fossiliferous with molds <1/4", trace secondary infilling	SC-1 collected at 72.9- 74.0' -



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-02

SHEET 5 OF 13

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 1.5	ft bgs	s on 03	3/22/07 START : 3/22/2007 END : 4/	5/200	7 LOGGER : R. Bitely	
≥ □ ≈	(%			DISCONTINUITIES	၂ ပွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	·	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
FAC	E RI GTH OVE	(%) Q	DG.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOL	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP' SUR ELE\	COR LEN( REC	ROI	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
		-	NR/		Ü	Silt (ML)	
-			0		ш	72.3-72.8' - moist, nonplastic, rapid	-
-				77.65' - Fracture zone (>5), rough,	₽	dilatancy Limestone	-
-			>10	undulating, <1" open		72.8-76.25' - Same as 71.5-72.3'	-
-	R5-NQ			77.85' - Fracture, 60 deg, rough, undulating, <1/2" open	H	except voids (<3/16") over up to 80% of surface	-
-	5 ft 100%	60	1	78.5' - Fracture, 25 deg, smooth, undulating,	$\vdash$	No Recovery 76.25-76.5'	-
80	100%			tight 78.85' - Bedding plane, <10 deg, smooth,	仜	Limestone 76.5-77.0' - pale yellowish brown to	-
-38.4			2	undulating, <1/4" clay infilling, tight		moderate yellowish brown, (10YR 6/2	
-				79.0' - Mechanical break 79.6' - Fracture, horizontal, rough, undulating,	$\dagger$	to 10YR 5/4), very fine to fine grained, moderate to strong HCl	R5: 11 minutes
-	01 5		3	tight	F	reaction, very weak to weak (R1 to	-
-	81.5			80.45' - Fracture, 40 deg, rough, undulating, tight	Ħ	R2), voids (<3/16") over 50% of rock surface, trace black organics	-
-			1	80.7' - Fracture, horizontal, rough, undulating,	L	Silt (ML)	-
-				tight 80.85' - Fractures (2), horizontal and 30 deg,	╀	77.0-77.3' - moderate olive brown, (5Y 4/4), moist, nonplastic, firm to	=
-			0	intersecting, tight	F	hard, trace lignite	-
-	R6-NQ			81.75' - Fracture, 15 deg, rough, stepped, tight	世	Limestone 77.3-78.15' - Same as 76.5-77.0'	=
-	5 ft	74	2	83.5, 83.8' - Fractures (2), 15 deg, rough,		Silt (ML)	=
0.5	88%			undulating, to stepped, tight 84.0' - Mechanical break	$\vdash$	- 78.15-78.25' - Same as 77.0-77.3'	=
85 -43.4			2	84.65' - Fracture, 50 deg, rough, undulating, —	F	<b>Limestone</b> 78.25-81.5' - Same as 76.5-77.0'	_
-			0	tight . 85.15' - Fracture, horizontal, rough,	世	<ul><li>except 1/4" clay lense at 78.8',</li></ul>	R6: 24 minutes
-	00.5		NR	undulating, <1" open	₽	medium dark gray (N4), plastic, with organics, calcareous, extremely	=
-	86.5			00.05.00.751	$\Box$	<ul> <li>weak to very weak (R0 to R1) from</li> </ul>	-
-			>10	86.65-86.75' - Fracture zone, rough, undulating, <1-1/2" open	仜	78.25-79.95' with trace voids and laminated bedding at 78.8'	SC-2 collected at 87.05-
-				87.05' - Mechanical break	士	- 79.5-81.5' - weak to medium strong	87.8' -
-			0		$\vdash$	(R2 to R3), voids (<3/16') over 50-80% of surface, few cavities	=
-	R7-NQ				厈	<ul><li>(1-1/2" x 1/2"), some cavities with</li></ul>	-
-	5 ft	56	>10	88.85-89.05' - Fracture zone, rough,	Ħ	secondary infilling 81.5-85.9' - very pale orange to	-
	75%			undulating, <3" open	世	<ul> <li>moderate yellowish brown, (10YR 8/2 to 10YR 5/4), very fine to fine</li> </ul>	-
90 <u> </u>			2	89.85' - Fracture, 80 deg, rough, undulating, —	H	grained, moderate HCl reaction,	-
-				tight 90.05' - Fracture, 55 deg, rough, undulating,	匚	<ul> <li>weak to medium strong (R2 to R3), voids (&lt;3/16') covering 20-70% of</li> </ul>	R7: 15 minutes
-	04.5		NR	<1/2" open	口	surface at 81.5-83.5' and 83.8-84.9'	=
-	91.5			-	士	<ul> <li>increasing with depth, with secondary infilling, bioturbation accounts for</li> </ul>	=
-			1		$\vdash$	- 30% of surface area	-
-				92.3' - Bedding plane, horizontal, rough,	F	<ul> <li>83.5-83.8' - extremely weak to very weak (R0 to R1), with elastic silt</li> </ul>	-
-			0	undulating, silt and/or clay sized infilling, <1/4" open	片	<ul> <li>laminations and organics</li> </ul>	=
-	R8-NQ			93.15' - Mechanical break	L	No Recovery 85.9-86.5'	-
-	5 ft	95	1		F	}	-
-	98%				匚	<u> </u>	-
95 <u> </u>			0	_	士	<u> </u>	-
-				-		<del> </del>	R8: 11 minutes
-			0	-	F	}	-
-	96.5				⊭		Stop coring on 03/23/2007
					1		



PROJECT NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	VATER LEVELS: 1.5 ft bgs on 03/22/07										
200	6)			DISCONTINUITIES	Ö	LITHOLOGY	COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.				
100 -58.4	R9-NQ - 5 ft 100%	100	0 0 0	96.8, 98.75, 99.0, 99.2' - Mechanical break (4)		Limestone  - 86.5-90.25' - moderate yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), very fine to fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids (<3/16') over 50-80% of rock surface, highly fossiliferous with molds (1/4" diameter), trace organics, trace laminated bedding, few cavities (<1-1/2" x 1"), extremely weak (R0) to very weak (R1) from 86.5-86.56'  No Recovery 90.25-91.5'	Resume coring at 08:00 on 03/24/2007 - Water level at 1' below ground surface -				
- - - 105 -63.4	101.5 R10-NQ 5 ft 98%	98	0 0 0	104.0, 106.35' - Mechanical break (2) -		Limestone  91.5-96.4' - yellowish gray to moderate yellowish brown, (5Y 8/1 to 10YR 5/4), very fine to fine grained, moderate to strong HCI reaction, very weak to weak (R1 to R2), voids (<3/16") over 70% from 91.5-92.3' and 94.7-96.4', voids (<3/16") over 10-30% of surface from 92.3-94.7'; cavities <1-1/2" x 1/2" partially infilled with silt; clay lense from 94.0-94.05' (elastic silt to fat clay, CH-MH, grayish olive (10YR 4/2), calcareous); fossiliferous especially at 94.7-96.4'	- - - - - - - R10: 11 minutes				
110 -68.4	106.5 R11-NQ 5 ft 99%	42	0 NR 1 4 5	106.6' - Fracture (2), vertical and horizontal, rough, undulating, <1/2" open  107.7, 108.0, 108.25' - Fractures (4), horizontal and 80-90 deg, rough, undulating, four intersecting fractures, tight 108.65, 108.8, 108.9, 109.05, 109.15' - Fractures (>5), horizontal and 80-90 deg, rough, undulating, intersecting fractures, tight 109.6, 109.7, 109.8, 109.95, 110.1, 110.3, 110.6, 110.7' - Fractures (>8), horizontal and 80-90 deg, rough, undulating, intersecting fractures, tight 111.1, 111.2-111.9' - Fracture zone (2), horizontal and 75-90 deg, rough, undulating,		No Recovery 96.4-96.5' Limestone 96.5-101.5' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), voids (<3/16") over 50% of rock surface, trace laminated bedding, moderately to highly fossiliferous with molds <1/2", few cavities 1" x 1/2" 101.5-106.4' - Same as 96.5-101.5' except strong HCl reaction, trace organic lenses <1-1/2" x 1/4", few cavities <3/4" x 1/2" No Recovery 106.4-106.5' Limestone 106.5-111.45' - yellowish gray, (5Y	Driller's Remark: 30-40% loss of circulation at 108.5' - R11: 5 minutes				
115 -73.4	R12-NQ 5 ft 100%	68	1 >10 7 1 1	tight 112.45, 112.65, 112.7, 113.0' 113.1, 113.25'		7/2), very fine to fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), voids (<3/16") over 50-70% of rock surface, trace laminated bedding, moderately fossiliferous with molds <1/4" in diameter No Recovery 111.45-111.5' Limestone 111.5-116.5' - Same as 106.5-111.45' except poorly to moderately fossiliferous, fossil casts/molds <1/2" x 1/4", laminated bedding over <30% of rock surface	SC-3 collected at 114.4- 115.3'				



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A-02

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS: 1.5	ft bgs	s on 0	3/22/07 START : 3/22/2007 END : 4/	5/200	LOGGER : R. Bitely	
<b>₹</b> □ <i>⊋</i>	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
ELO ON (#	JN, AND RY (6	(	ZES T	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B FACE	E RU 3TH, OVE	%) ⊂	FOG	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				116.6' - Fracture, 60 deg, rough, undulating,		Limestone	
_			1	tight	Н	<ul> <li>116.5-121.2' - yellowish gray, (5Y 7/2), very fine to fine grained, strong</li> </ul>	-
_	-			·	H	HCl reaction, very weak to weak (R1	-
_			1	118.05' - Bedding plane, horizontal, rough,	Ħ	<ul> <li>to R2), voids (&lt;3/16") over 30-70% of rock surface increasing with depth,</li> </ul>	-
-	R13-NQ			undulating, <1/4" open	ш	moderate to highly fossiliferous	-
-	5 ft 94%	82	0	-	Ш	<ul> <li>increasing with depth, fossil molds/casts &lt;1/2" in diameter,</li> </ul>	-
120				-	Н	several cavities (<1-1/2" x 1/2"),	1
-78.4			2	120.0' - Fracture, 75 deg, rough, undulating,	Ш	— trace secondary infilling and organics	
_			>10	<1/4" open	ш	_	R13: 5 minutes
	121.5		NR	121.0-121.3' - Fracture zone, rough,	$\blacksquare$	- No Recovery 121.2-121.5'	1
				undulating, <1-1/2" angular gravel sized rock fragments	Ы	Limestone	Possible loss of circulation,
			1	121.8' - Fracture, horizontal, rough,	$\vdash$	121.5-123.0' - yellowish gray to pale yellowish brown, (5Y 7/2 to 10YR	100% loss of circulation as - R14 proceeded
1			10	undulating, <1/2" open 122.55, 122.65, 122.8, 122.9, 123.05' -	Ħ	6/2), very fine to fine grained, strong	]
			10	Bedding plane (5), <10 deg, smooth, undulating, tight to 1/4" open	Ш	<ul> <li>HCl reaction, very weak to weak (R1 to R2), voids (&lt;3/16") over 30-50% of</li> </ul>	
	R14-NQ 5 ft	82	0	122.65, 122.95' - Fractures (2), 80 deg and	Ш	rock surface, laminated bedding over 20% of surface from 123.0-125.0'	
	96%	02		vertical, rough, undulating, tight 123.85, 124.5, 124.7' - Mechanical break (3)	Н	with trace secondary infilling and	
125			0		Щ	poorly fossiliferous — 123.0-125.0' - Same as 121.5-123.0'	
-83.4			L		ш	except granular texture up to medium	
			1	125.65' - Bedding plane, horizontal, smooth,	ш	grained, very fossiliferous, fossil - casts/molds <1' x 1/2"	R14: 10 minutes
_	126.5		NR.	undulating, tight	Ш	125.0-126.3' - Same as 121.5-123.0'	
_			1	107.01.5	Н	No Recovery 126.3-126.5' Limestone	_
_				127.0' - Fracture, 60 deg, rough, undulating, tight	H	126.5-131.5' - yellowish gray, (5Y 7/2), very fine to fine grained, strong	-
_			0	127.7' - Bedding plane, 15 deg, smooth,	H	<ul> <li>HCl reaction, very weak to weak (R1</li> </ul>	_
_	R15-NQ			undulating, tight, possible mechanical break	H	to R2), laminated bedding from 127.35-127.7', voids (<3/16") over	-
_	5 ft	100	0	-	ш	<ul> <li>10-40% of rock surface especially</li> </ul>	-
-	100%				₽	from 126.5-127.35' and 130.35-131.5', poorly to moderately	-
130 <u> </u>			1	_	П	fossiliferous, few fossil molds/casts	-
-				130.35' - Fracture, horizontal, rough,	H	<1/2" x 1/4", trace secondary infilling, trace cavities <3/4" x 1/2"	SC-4 collected at 130.4-
-			0	undulating, <1/4" open	団	-	131.5' _ R15: 8 minutes
-	131.5			131.6' - Bedding plane, rough, undulating,	Ш	131.5-136.5' - yellowish gray, (5Y	-
-			1	<1/a>/ <1/2" open, possible mechanical break	Н	<ul> <li>7/2), very fine to fine grained, strong</li> </ul>	-
-				-	Ħ	HCl reaction, very weak to weak (R1 to R2), limestone with voids (<3/16')	-
-			0	-	Ħ	<ul> <li>over 50% of rock surface interbedded with limestone having</li> </ul>	-
-	R16-NQ				Ħ	laminated bedding with trace voids	
-	5 ft 100%	94	0		Ш	<ul> <li>(&lt;3/16"), moderate to highly fossiliferous zones, fossil molds</li> </ul>	
135	100 /0				ᡛᡰ	<1/2" x 1/4", trace secondary infilling	
-93.4			1	— 135.15' - Fracture, 45 deg, rough, undulating,	囯	— of cavities	-
-				tight	H	-	R16: 22 minutes
-	136.5		2	-	Ш	-	
					$\Box$		



PROJECT NUMBER:	BORING NUMBER:				-	
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	VATER LEVELS: 1.5 ft bgs on 03/22/07 START: 3/22/2007 END: 4/5/2007 LOGGER: R. Bitely										
≥∩≘	(%)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.				
28 H	SHR	ď		THICKNESS, SURFACE STAINING, AND TIGHTNESS  135.95, 136.15' - Fracture (2), horizontal,	S	CHARACTERISTICS  Limestone	Brond, rear readers, ero.				
-			6	smooth, undulating, to rough, tight  137.55, 137.6, 137.9, 137.95, 138.0, 138.05' - Bedding plane (6), <10 deg, smooth to rough, undulating, tight to 1/4" open		<ul> <li>136.5-141.5' - yellowish gray to moderate yellowish brown, (5Y 7/2 to 10YR 5/4), very fine to fine grained,</li> <li>strong HCl reaction, very weak to weak (R1 to R2), laminated bedding</li> </ul>	- - -				
-	R17-NQ 5 ft 100%	90	0	139.0, 140.55, 141.45' - Mechanical break (3)		from 137.5-138.05' and - 140.2-140.65', voids (<3/16") over 0-30% of rock surface from 136.5-137.5', 138.05-140.2', and	- - -				
140 -98.4 -			0			— 140.65-141.5' - -	R17: 9 minutes				
-	141.5				E	_ 141.5-142.0' - yellowish gray to dark	-				
-			3	141.65' - Fracture, 40 deg, rough, undulating, tight 141.8' - Fracture, 50 deg, rough, undulating,	H	yellowish brown, (5Y 7/2 to 10YR     4/2), very fine to fine grained, mild to moderate HCl reaction, medium	Water level at 1' below ground surface at 14:30 -				
			1	tight 142.0' - Fracture, <10 deg, rough, undulating, <1/2" open		<ul> <li>strong (R3), minor infilling with medium grained and weak to</li> </ul>	]				
_	R18-NQ 5 ft 86%	54	3	142.6' - Mechanical break 143.3' - Fracture, <10 deg, rough, undulating, <1/4" open		medium strong (R2 to R3) limestone, trace voids (<3/16") 142.0-145.2' - Same as 141.5-142.0'	-				
145 -103.4			10	143.6' - Fracture, 40 deg, rough, undulating, tight 144.1' - Fracture, <10 deg, rough, undulating,		except voids (<3/16") over 10-30% of  rock surface, many cavities (<2" x 1") up to 40% secondary infilling with	_				
-	146.5		0 NR	tight 144.2-144.25, 144.85-144.9' - Fracture zone (2), <10 deg, rough, undulating, <1" open,		medium grained limestone, highly fossiliferous with molds and casts <1/2", possibly bioturbated	R18: 19 minutes				
-			0	subangular to angular rock fragments <1" in diameter 145.2' - Fracture, 15 deg, rough, undulating,		145.2-145.8' - Same as 141.5-142.0' - except laminated bedding, trace voids, poorly fossiliferous No Recovery 145.8-146.5'	-				
-	D40 NO		1	tight 145.4' - Bedding plane, horizontal, smooth, undulating, tight		Limestone 146.5-151.5' - pale yellowish brown to moderate yellowish brown, (10YR	-				
-	R19-NQ 5 ft 100%	92	0	147.85, 149.0' - Mechanical break (2) 148.05' - Bedding plane, horizontal, smooth, undulating, <1/4" open	Ħ	6/2 to 10YR 5/4), very fine to fine grained, moderate to strong HCl reaction, weak to medium strong (R2	-				
150 -108.4 -			0	_		to R3), trace laminated bedding, trace organics, voids (<3/16") over 10% of rock surface, moderately	R19: 6 minutes				
-	151.5		1	151.15' - Fracture, 60 deg, rough, undulating, possible mechanical break, 1/4" open		fossiliferous with molds/casts <1" x 1/2", cavities <1/2" diameter from 146.5-146.6'	- -				
-			1	151.9' - Bedding plane, horizontal, smooth, undulating, <1/4" open 152.0, 152.2, 152.4, 155.95' - Mechanical		151.5-151.9' - pale yellowish brown to dark yellowish brown, (10YR 6/2 to 10YR 4/2), fine to medium grained,	SC-5 collected at 152.4-				
-	R20-NQ		0	break (4)		mild HCl reaction, weak (R2), trace secondary infilling 151.9-154.1' - Same as 151.5-151.9'	153.25'				
- 155	5 ft 97%	83	1	154.0' - Fracture, 70 deg, rough, undulating, tight	$\vdash$	except very fine to fine grained, medium strong (R3), voids (<3/16") over 20% of rock surface, moderately to poorly fossiliferous,	]				
-113.4 -			6	154.65, 154.7, 154.8, 154.95, 155.05, 155.3'			R20: 10 minutes				
_	156.5		0		$\blacksquare$	-	-				



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-02

SHEET 9 OF 13

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING	NIE I NOD A	ND E	JUIPIV	IENT: Dietrich D-50 S/N 232, mud rotary, NQ tools, HW	casin		ORIENTATION : Vertical
WATER	LEVELS : 1.5	ft bg	s on 03	3/22/07 START : 3/22/2007 END : 4/	5/200	7 LOGGER : R. Bitely	
>00			_	DISCONTINUITIES	ტ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	30D(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	0	_	NR/		H	Limestone	<del>                                     </del>
-			1	156.85, 158.0, 160.8, 161.1' - Bedding plane (4), horizontal, rough, undulating, <1/4" open		<ul> <li>154.1-154.8' - Same as 151.5-151.9'</li> <li>except laminated bedding, voids</li> <li>(&lt;3/16") over 30-50% of rock</li> <li>surface, poorly to moderately fossiliferous</li> </ul>	
-	R21-NQ 5 ft 100%	94	0	158.7, 158.55, 158.95, 159.15, 159.7' - Mechanical break (5)	Ħ	Limestone - 154.8-155.3' - Same as 151.5-151.9' except weak to very weak (R2 to R1),	
160 -118.4			0	_	H	laminated bedding, — 155.3-156.35' - Same as 151.9-154.1'	_
-	161.5		2		H	No Recovery 156.35-156.5' Limestone 156.5-161.5' - pale yellowish brown	R21: 8 minutes Water level is <1.5' below
-			2	161.6, 162.4, 163.35, 164.7, 164.85, 165.05, 165.7, 165.8, 165.85, 165.9, 166.0, 166.05, 166.1, 166.25, 166.3, 166.45' - Bedding plane	Ħ	to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, strong HCI reaction, voids	ground surface at 17:45  Original boring A-2 completed to 161.5' and
			1	(16), <10 deg, smooth, undulating, to rough and planar, tight to <1/4" open		(<3/16") over 40-60% of rock surface, trace organics, moderately to highly fossiliferous, laminated	abandoned on 03/24/2007; replacement boring offset 7' NE from original and
-	R22-NQ 5 ft 100%	75	0	164.0, 164.15' - Mechanical break (2)		<ul> <li>bedding, secondary infilling of</li> <li>cavities over &lt;10% of rock surface,</li> <li>open cavities (&lt;1/2") over 10% or</li> <li>rock surface</li> </ul>	drilled to 161.5' with 3-7/8" tri-cone roller bit on NWJ rods, samples not collected
16 <u>5</u> -123.4			3		H	161.5-166.5' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1	NW casing installed in replacement boring to 161.5 on 03/29/2007,
-	166.5		>10		Ħ	to R2), voids (<3/16") over 20% of rock surface except from 161.5-162.4' where voids cover	coring begins at 161.5' on 04/03/2007 at 11:30 Water level is <1.5' below
-			5	166.5-166.7' - Bedding plane (5), horizontal, smooth, undulating to planar, tight		20-50% of rock surface, poorly to moderately fossiliferous with fossil casts <1/4" in diameter, trace	ground surface at 09:00 on 04/03/2007 R22: 5 minutes
_			>10	167.65, 167.75, 167.8, 167.9, 167.95, 168.0, 168.1, 168.15, 168.2, 168.25' - Bedding plane (10), horizontal, smooth, undulating, to	Ħ	laminated bedding  166.5-170.4' - yellowish-gray to light  olive gray, (5Y 7/2 to 5Y 5/2), very	
-	R23-NG 5 ft 78%	58	0	planar, tight 168.25-168.35' - Fracture zone or bedding plane, smooth, undulating, to rough and		fine to fine grained, very weak to medium strong (R1 to R3), strength increases with depth, trace laminated	
170 -128.4			1	planar, tight to <1/4" open, multiple bedding plane fractures with vertical intersecting fractures	Ħ	bedding from 166.5-168.4', voids (<3/16") trace to 30-40% of rock surface from 168.4-170.4',	-
-	171.5		NR	169.0, 169.45' - Mechanical break (2) 169.55' - Fracture, <10 deg, rough, undulating, silt and/or clay sized infilling,		moderately fossiliferous with molds <3/4" x 1/4" No Recovery 170.4-171.5'	R23: 12 minutes
-			4	<1/4" open, trace organic stain 171.55, 172.1, 172.2, 172.4, 173.2, 173.65, 173.85, 174.35' - Bedding plane (8), <10 deg,	Ħ	Limestone 171.5-176.4' - yellowish gray, (5Y 7/2), very fine to fine grained,	
-			1	smooth, undulating, to rough and planar, tight to <1/4" open 172.85, 175.35' - Mechanical break (2)	E	moderate HCl reaction, very weak to medium strong (R1 to R3), medium strong (R3) rock at 171.5-172.1',	
-	R24-NQ 5 ft 98%	64	4	174.1' - Fracture, 70 deg, rough, undulating,	Ħ	172.2-174.5', and 174.95-176.4'; voids (<3/16") over 30-40% of rock surface, poorly fossiliferous with	
175 -133.4			10	tight 174.55-174.65' - Fracture zone, rough, undulating, gravel sized fragments		molds <1/2" x 1/4", trace laminated bedding	SC-6 collected at 175.35-
_	176.5		0	174.7, 174.9 - Bedding plane (2), <10 deg, smooth, undulating to planar, tight to <1/4" open			176.4' R24: 7 minutes



PROJECT NUMBER:

338884.FL BORING NUMBER:

A-02 SHEET 10 OF 13

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 1.5	ft bg	s on 0	3/22/07 START : 3/22/2007 END : 4/	5/200	7 LOGGER : R. Bitely	-
≥∩≘	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 180 -138.4	R25-NQ 5 ft 86%	16	5 3 >10 NR	176.6, 179.2' - Mechanical break (2) 176.8, 177.2, 177.5, 177.7, 178.1, 178.15, 178.3, 178.75, 179.05, 179.35, 179.55, 179.6, 179.65, 179.7, 179.85, 180.15, 180.2, 180.4, 180.45, 180.5, 180.6' - Bedding plane (21), <10 deg, smooth to rough, undulating to planar, tight to <1/4" open 178.45-178.44, 180.4-180.45, 180.5-180.6' - Fracture zone (3), smooth to rough, undulating, tight to 1/2" open		No Recovery 176.4-176.5'  Limestone 176.5-180.8' - yellowish gray to moderate yellowish brown, (5Y 7/2 to 10YR 5/4), very fine to fine grained, strong HCl reaction, very weak to medium strong (R1 to R3), voids (<3/16") over 5-30% of rock surface, poorly to moderately fossiliferous with fossil molds <1/2" diameter, trace laminations, few cavities <3/4" x 1/4"; zones of very light gray (N8), very fine grained, non-fossiliferous strong rock (R4) at 178.15-178.3' and 178.75-179.35'	R25: 19 minutes
- - - - 185 -143.4 -	R26-NQ 5 ft 90%	48	>10 4 >10 1 0 NR	181.5-181.65' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter 181.7' - Fracture zone, 20 deg, rough, undulating, <1/4" open 182.7, 182.9, 183.1, 183.4, 183.55, 183.7, 183.75, 183.8, 183.95, 184.1, 184.35' - Bedding plane (11), <10 deg, smooth, undulating, tight to <1/4" open 184.15' - Fractures, horizontal and vertical, rough, undulating, multiple intersecting fractures 185.6' - Fracture, <10 deg, rough, undulating, <1/2" open		No Recovery 180.8-181.5' Limestone  181.5-184.8' - yellowish gray to pale yellowish brown, (5Y 7/2 to 10YR  6/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (<3/16") over 30-50% of rock surface, poorly fossiliferous with few fossil molds <1/2" x 1/4"  184.8-186.0' - Same as 181.5-184.8' except trace organics at 184.8', voids (<3/16") over 50% of rock surface, highly fossiliferous with molds 3/4" x 1/4", large cavity at 187.75' (2-1/2" x	R26: 15 minutes
- - - 190 -148.4 -	R27-NQ 5 ft 96%	56	2 4 0 4 >10 NR	186.6' - Fracture or mechanical break, rough, undulating, <1/2" open 187.4, 187.65, 187.95, 188.1, 188.3' - Bedding plane (5), <10 deg, smooth, undulating to planar, tight to 1/4" open  189.65, 189.85, 190.5, 190.9, 191.05' - Fractures or mechanical break (5), rough, undulating, <1/2" open 190.5, 190.6, 191.05, 191.3' - Fracture zone (4), rough, undulating, rock fragments up to 1" diameter and sand sized grains		1-1/2")  No Recovery 186.0-186.5' Limestone  186.5-189.5' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, moderate to strong HCl reaction, medium strong (R3), interbedded and laminated fine and very fine grained limestone, undulating bedding planes, voids (<1/16") over <20% or rock surface, poorly fossiliferous with fossil molds <1/2" in diameter, several cavities 1-1/2" x 1/2"  189.5-191.3' - Same as 186.5-189.5'	R27: 10 minutes
- - - 195_ -153.4	R28-NQ 5 ft 96%	56	2 >10 3 2 >10	191.65' - Fracture or mechanical break, <10 deg, rough, undulating, <1/4" open  192.45' - Fracture or mechanical break, 20 deg, rough, undulating, <1/2" open  192.65' - Fracture or mechanical break, <10 deg, rough, undulating, tight  192.9-193.1' - Fracture zone, rough, undulating, gravel sized fragments <2" diameter  193.35, 193.45, 193.65, 193.8, 194.2, 194.6' - Bedding plane or mechanical break (6), <10 deg, rough, undulating, tight to <1/4" open  195.05' - Fracture or mechanical break, horizontal, rough, undulating, tight		except extremely weak to weak (R0 to R2), voids (<3/16") over 50% of rock surface, poorly to moderately fossiliferous, several cavities <1/2"  No Recovery 191.3-191.5'	Stop coring at 18:00 on 04/03/2007



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-02	SHEET	11	OF	13

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 1.5	ft bg	s on 0	3/22/07 START : 3/22/2007 END : 4/5	5/200	LOGGER : R. Bitely	
<b>₹</b> □₽	(%)			DISCONTINUITIES	90	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 200 -158.4	R29-NQ 5 ft 68%	20	>10 2 >10 2 NR	195.65' - Fracture or mechanical break, 50 deg, rough, undulating, tight 196.0-196.3' - Fracture zone, rough, undulating, gravel sized fragments <1-1/2" diameter 196.5-196.65, 196.9-197.35, 198.85-199.0' - Fracture zone (3), rough, undulating, angular gravel sized fragments <1-1/2" diameter 197.9' - Fracture or mechanical break, 30 deg, rough, undulating, <1/4" open 198.4' - Fracture or mechanical break, <10 deg, rough, undulating, <1/2" open 198.6, 198.8' - Mechanical break (2) 199.25, 199.4, 199.55' - Bedding plane (3),		Limestone  191.5-194.5' - moderate yellowish brown to yellowish gray, (10YR 5/4 to 5Y 8/1), very fine to fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), interbedded with weak to medium strong (R2 to R3) rock from 192.0-193.6', voids (<3/16") over 20-30% of rock surface, cavities <2" x 3/4", poorly fossiliferous, trace secondary infilling with fine grained texture 194.5-196.3' - Same as 191.5-194.5' except medium strong (R3), voids	Core barrel sand-locked at 196.5' on 04/03/2007, core barrel freed from sandlock by over-drilling NW casing from 161.5' to 195.0' on 04/04/2007  Continue coring from 196.5 at 13:30 on 04/04/2007  R29: 7 minutes
	201.5 R30-NQ 5 ft 74%	10	>10 >10 >10 >10 >10	<10 deg, smooth, planar, tight 199.7' - Bedding plane, horizontal, smooth, undulating, silt and/or clay sized infilling, organic stained, poorly indurated organic silt lens, <1/4" open 201.8' - Fracture or mechanical break, 60 deg, rough, stepped to undulating, tight to <1/4" open 201.9' - Bedding plane, <10 deg, rough, undulating, <1" open 202.05' - Fracture, vertical, rough, undulating 202.2-202.4, 202.55-202.8' - Fracture zone (2), rough, undulating, gravel sized fragments <1-1/2" diameter 202.9, 203.0, 203.15, 203.35, 203.5, 203.7' - Bedding plane (6), <10 deg, smooth,		(<3/16") over 30% of rock surface, fossiliferous with molds <1/2" in diameter, strong color contact at 194.5'  No Recovery 196.3-196.5' Limestone  196.5-199.0' - pale yellowish brown, (10YR 6/2), very fine to fine grained, moderate HCI reaction, extremely weak to very weak (R0 to R1), laminar interbeds of very fine to fine grained material, trace organics, poorly to moderately fossiliferous, voids (<3/16") over <20% or rock surface, dissolution cavities <1/2"	R30: 14 minutes
-168.4	206.5 R31-NQ 5 ft 64%	40	>10 >10 1 1 NR	undulating, tight to <1/4" open 203.7-203.9, 204.35-204.7' - Fracture zone (2), rough, undulating, gravel sized fragments <2" diameter 205.0' - Fracture, 40 deg, rough, undulating, <1" open 206.8' - Fracture or mechanical break, 20 deg, rough, undulating, <1/2" open 206.95' - Fracture or mechanical break, <10 deg, rough, undulating, <1/2" open 207.35-207.55' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter 207.95, 208.85' - Mechanical break (2) 208.3, 208.4' - Bedding plane (2), <10 deg, rough, undulating, <1/4" open		diameter over 20-30% of rock surface 199.0-199.9' - Same as 196.5-199.0' except very fine grained, extremely weak to medium strong (R0 to R3), trace organics as laminations, voids and fossils absent No Recovery 199.9-201.5' Limestone 201.5-204.0' - yellowish gray to pale yellowish brown, (5Y 7/2 to 10YR 6/2), very fine to fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), interbedded with extremely weak to very weak (R0 to R1) limestone, 20%	R31: 7 minutes
- - - 215 -173.4	R32-NQ 5 ft 34%	7	>10 >10 NR	209.1' - Fracture or mechanical break, rough.		laminated, trace organic laminations especially at 204', friable, voids (<3/16") over 10% of rock surface, few consolidated seams up to 1/2" thick with 50% voids, poorly fossiliferous with molds <1/2" diameter 204.0-205.2' - Same as 201.5-204.0' except voids (<3/16") over 10% of rock surface, moderately fossiliferous with molds <1/4" in diameter, few cavities with secondary infilling 1" x 1/2"  No Recovery 205.2-206.5'	- - - - - - R32: 11 minutes
	<u> </u>						



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-02

SHEET 12 OF 13

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 1.5	ft bgs	s on 0	3/22/07 START : 3/22/2007 END : 4/	5/200	7 LOGGER : R. Bitely	
300	()			DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			>10	216.7, 216.9' - Bedding plane (2), <10 deg, smooth, undulating, to rough, tight to <1/4" open 216.9-218.2' - Fracture zone, rough, undulating, gravel sized fragments <2"		Limestone  206.5-207.0' - yellowish gray, (5Y 8/1), very fine to fine grained, moderate to strong HCI reaction, - very weak to weak (R1 to R2), with lenses of extremely weak (R0) rock,	Formation collapsing on core barrel at 216.5', - advance NW casing to 209' _
-220 -178.4 -	R33-NQ 5 ft 38%	0	NR	diameter, stain on surface @ 217.6' (laminated organics)	voids (<3/16") over 10-30% of rock surface, poorly to moderately fossiliferous with molds/casts <1/2" in diameter, friable 207.0-208.3' - moderate to strong HCl reaction, poorly consolidated silts to very weak (R1) rock, laminated bedding, trace voids in few bedding planes, fossils absent 208.3-209.7' - Same as 206.5-207.0'	R33: 14 minutes	
- - -	221.5		>10	221.5-221.7' - Fracture zone or mechanical break, rough, undulating, angular gravel sized fragments <1-1/2" diameter	Stop coring at 221.5 at 18:30 on 04/04/2007; water level at ground level Resume coring at 07:00 on 04/05/2007 - Recovery loss for R34 due		
- 225 -183.4 -	R34-NQ 5 ft 4%	0	NR			moderate to strong HCl reaction, extremely weak to weak (R0 to R2), voids (<3/16") over <20% of rock surface, few cavities <1/2" diameter No Recovery 213.2-216.5' Limestone 216.5-218.4' - yellowish gray, (5Y 8/1), very fine to fine grained, moderate HCl reaction, very weak to	to core barrel blockage at 221.7' -
-	226.5		>10	226.6, 226.75, 226.9, 226.95, 227.05, 227.2, 227.5' - Fractures or mechanical break (7),		weak (R1 to R2), voids (<3/16") over 20-40% of rock surface, moderately fossiliferous with molds/casts <1/2" diameter, trace organic laminations	-
-	Doc No		>10	<10 deg, rough, undulating, <1" open, gravel sized fragments <1/2" diameter 227.5-228.1' - Fracture zone, rough, undulating, angular gravel sized fragments		No Recovery 218.4-221.5' Limestone 221.5-221.7' - yellowish gray, (5Y 8/1), very fine grained, mild to	- -
230 -188.4	R35-NQ 5 ft 36%	0	NR	<1" diameter		moderate HCI reaction, weak to medium strong (R2 to R3), voids  - (<3/16") over 20-30% of rock surface, moderately fossiliferous, with molds/casts <1/2" diameter, few cavities <1/2" diameter	- - -
-	231.5					No Recovery 221.7-226.5' Limestone 226.5-228.3' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to	R35: 12 minutes - SC-7 collected at 231.5-
-			0	232,5' - Bedding plane, horizontal, smooth,		moderate HCI reaction, extremely weak to very weak (R0 to R1), voids (<3/16") over 10-30% of rock	232.5' -
- - - 235	R36-NQ 5 ft 40%	20	>10	undulating, <1/8" open 232.6' - Fracture, 60 deg, rough, undulating, tight 232.8-233.5' - Fracture zone, rough, undulating, gravel sized fragments <2" diameter		surface, poorly to moderately fossiliferous, few cavities <1/4" diameter, trace organics, medium strong (R3) rock from 227.4-227.5' No Recovery 228.3-231.5'	- - - -
-193 <u>.4</u> - -	236.5		NR			-	R36: 18 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-02	SHEET	13	OF	13	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723946.2 N, 457608.0 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING	INETHOD A	ND E	ZUIFIV	IENT: Dietrich D-50 S/N 232, mud rotary, NQ tools, HV	Casii	9	ORIENTATION : Vertical
WATER	LEVELS : 1.5	ft bg	s on 0	3/22/07 START : 3/22/2007 END : 4	/5/200	7 LOGGER : R. Bitely	
>00	(6			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
240 -198.4 -245 -203.4 -250 -208.4	CORE HINDUST R37-NG 5 ft 58% PG 5 ft 17% 251.5	30	>10 2 10 NR >10 0 NR NR	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	TOTOLINAS HITH HITH HITH HITH HITH HITH HITH HIT	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
_					1	-	-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-03	SHEET	1	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 6 tri-cone bit

						, cathead, AWJ rods, 6 t			ORIENTATION : Vertical
TER	LEVELS	: 1.3 ft b	gs on 3/1	1/07	START : 3/10/2007	END : 3/12/2007	LOGGE	R : R.	Bitely, C. Wallestad, N. Jarzyniecki
ו⊋נ				STANDARD PENETRATION		SOIL DESCRIPTION		g ا	COMMENTS
SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,			SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
ATC		RECOVE	ERY (ft)		MOISTURE C	ONTENT, RELATIVE DI	ENSITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
LEV			#TYPE	6"-6"-6" (N)	CONSISTENCY	, SOIL STRUCTURE, M	INERALOGY	₩.	INSTRUMENTATION
ош 2.1				(IN)				0)	
-								-	C. Wallestad and N. Jarzyniecki also logged
-								-	portions of boring A-03
-								-	
-								-	
-								-	
-								-	
-	3.5				Poorly Graded S	and With Silt (SP-SM	1	10.10	
-				3-4-6	3.5-4.7' - very pal	e orange and dark vel	owish orange.	111	1
-		1.2	SS-1	(10)	(10YR 8/2 and 10	YR 6/6), wet, loose, vend, 6% nonplastic fine	ery fine to fine	444	
1	5.0				matter, trace iron	cemented sand nodul	es <1/4" 7	11/1	Moderate to light obetter slew adver-
' 4					diameter		/	1	Moderate to light chatter, slow advancemen at 5.0-8.5'
4								4	
4								4	
4								4	
4								1	
								1	
_	8.5				6:11 (441.)			<b>1</b>	
_				3-8-4	<b>Silt (ML)</b> 8.5-9.4' - pale vel	lowish orange, (10YR	8/6). wet. stiff.	4111	
		0.9	SS-2	(12)	nonplastic to low	plasticity, rapid dilatan	cy, mild to	╨	
	10.0				sand, all carbona	action, 5-10% fine to m	ledium grained	4	
1 -							,	1	
								4	
_								4	Variables delle a state 5 40 51
4								4	Very slow drilling at 11.5-13.5'
4								4	
4								-	
4	13:5	0.0	√ SS-3 ,	50/1	No Recovery 13.5	5_12 6'	,	╄	
4		\	( 33-3 )	(50/1")	NO NECOVERY 13.	J-1J.U	/	-	Rapid advancement
+								-	Trapid advancement
1							_	4	
4								-	
+								-	
+								-	
+								-	
-								1	
+								1	
+	18.5 18.8	0.3	SS-4	50/4	_ Silt With Sand (N	AL)		Ηп	1
4		\	<u> </u>	(50/4")	\ 18.5-18.8' - pale \	vellowish orange. (10Y	R 8/6), wet,	+	Very dense layer at 18.75', very slow
$\exists$					hard, nonplastic, 15-20% fine to m	rapid dilatancy, mild H edium grained sand, a	Oreaction, /	1	advancement
_					(1.0 ±0.70 mile to mile	g. aloa baria, a		+	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-03	SHEET	2	OF 1	12

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 6 tri-cone bit

WATER	LEVELS	: 1.3 ft bo	gs on 3/1	1/07	START : 3/10/2007 END : 3/12/2007	LOGGER	: R.	Bitely, C. Wallestad, N. Jarzyniecki
				STANDARD	SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			SYMBOLIC LOG	
		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, CO MOISTURE CONTENT, RELATIVE DENSI	OLOR, ITY OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINEF	RALOGY	/MB(	INSTRUMENTATION
				(N)			۱S	
22.1						_		_
						_		_
						_		Moderate to rapid advancement at 22.5'
23.5						_		_
_					Silty Sand (SM)	_	Ш	Sample SS-5 may be weak limestone
_		1.5	SS-5	23-36-46	23.5-25.0' - grayish orange, (10YR 7/4), wet dense, fine to coarse grained, mild to moder	t, very - rate HCl		-
25	25.0			(82)	reaction, 46% nonplastic fines, approximate	ely 5		-
17.1	23.0				interbedded extremely weak (R0) limestone <1/2" thick	lenses	111	-
-					VIII UIION	/ -		
-						-		-
-						-		-
-						-		-
_						_		-
-						-		-
_	28.5				Silty Sand (SM)	_	7-13-	-
_				8-9-27	28.5-30.0' - Same as 23.5-25.0' except dark	yellowish -		-
_		1.5	SS-6	(36)	orange, (10YR 6/6), dense, 1/2" lense of me plastic silt at 28.6', approximately 5 interbed	edium		-
30	30.0				limestone lenses up to 1/2" thick			Madayata diiliina yata with wayiahla thin
12.1					·			Moderate drilling rate with variable thin, dense zones.
_						_		-
_						_		_
_						_		_
_						_		_
l _								
	33.5						L	
		0.5	00.7	4-10-50/1.5	Silty Sand With Limestone (SM)	of		
	34.6	0.5	SS-7	(60/7.5")	33.5-34.0' - Same as 28.5-30.0' except 50% sample is limestone lenses to 1/2" thick	, UI		
35	0-7.0							7
7.1								_
-						_		1
-						-		7
-						-		-
-						-		-
-						-		-
-	38.5					-		-
-	36.5			22-50/5			717	-
-	39.4	0.9	SS-8	(72/11")		-		-
	55.7				h	F	11.1	-
40						1_		



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	A-03	SHEET	3	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 6 tri-cone bit

WATER	LEVELS	: 1.3 ft bg	s on 3/1	1/07 5	START : 3/10/2007 END : 3/12/2007	LOGGER	: R.	Bitely, C. Wallestad, N. Jarzyniecki
> /				STANDARD	SOIL DESCRIPTION		Ģ	COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISSS OPOUR SYMPOL COLOR	СГО	DEDTILOF CACING DOULING DATE	
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR			DRILLING FLUID LOSS, TESTS, AND
EPT URF			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALC	OGY	SYME	INSTRUMENTATION
OEPTH BELOW  3.1  42.5	43.5	0.1			SOIL NAME, USCS GROUP SYMBOL, COLOF-MOISTURE CONTENT, RELATIVE DENSITY CONSISTENCY, SOIL STRUCTURE, MINERALC SIIty Sand With Limestone (SM)  38.5-39.4' - olive gray, (5Y 4/1), wet, very dense, to coarse grained, moderate HCI reaction, 30% nonplastic fines, with interbedded limestone lens 1" thick, all carbonate  Limestone Fragments  43.5-43.6' - olive gray, (5Y 4/1), mild to moderate reaction, coarse sand to fine gravel-sized fragme (<1/2" in diameter), trace fossils and voids <1/16 Begin Rock Coring at 43.5 ft bgs See the next sheet for the rock core log	PR PGY	SAMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION  Slow drilling with intermittent light chatter at 40.0-43.5'
60								_



PROJECT NUMBER:	BORING NUMBER:				
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				IENT . Dietrich D-50 5/N 252, mud rotary, NQ tools, HW			ORIENTATION: Vertical
WATER	LEVELS : 1.3	ft bg	s on 3		12/20		
>				DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
B 등 5	P. H. P. H	(%	FRACTURES PER FOOT			MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
H F F A	1	(%) 🛭	CT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	₽ BO	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
		ď	FRA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	ξ	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	43.5	_			<del>ا</del> ت	Limestone	HW casing installed to
_	] 3.5		0	-	世	- 43.5-45.9' - moderate yellowish	43.5'; begin rock coring at
1 _	R1-NQ		0			brown, (10YR 5/4), fine grained,	43.5'
45	2.5 ft	88	"	44.65' - Mechanical break	Н	weak to extremely weak (R2 to R0),	
-2.9	90%					— voids (<1/6") over 60-70% of rock	R1: 5 minutes
-	-		1	45.4' - Bedding plane or fracture, <10 deg,	₽	surface, hardness decreases with depth, highly to poorly fossiliferous	-
_	46.0		NR	rough, undulating, <1/4" open		- decreasing with depth, trace	_
	]		3	46.15, 46.25, 46.4' - Bedding plane or	$\vdash$	laminations	
1 -			3	mechanical break, 0-<10 deg, smooth,	$\vdash$	No Recovery 45.9-46.0'	]
-				undulating, <1/4" open -	仜	<ul> <li>Limestone</li> <li>46.0-50.3' - moderate yellowish</li> </ul>	-
-			1	46.55, 47.2, 47.85' - Mechanical break 47.4-47.65' - Clay seam	<del>-</del>	brown, (10YR 5/4), fine grained, very	-
_					E'	weak to extremely weak (R1 to R0),	_
	R2-NQ	77	0		Щ	voids (<3/16") over 40-80% of rock	
1 -	5 ft 86%	11	'	48.5' - Mechanical break	$\vdash$	surface increasing with depth, poorly	]
-	""			-	亡	<ul> <li>fossiliferous, moderately to highly fossiliferous with fossil molds from</li> </ul>	<u> </u>
-			1	49.25-49.45' - Clay seam -	╙	- 47.7-49.2'	-
50			لـبِــا		ь	_	
-7.9			1	50.25' - Bedding plane or mechanical break,		- No Recovery 50.3-51.0'	R2: 4 minutes
	51.0		NR	<10 deg, smooth, undulating, tight	$\vdash$	- NO RECOVERY 30.3-31.0	]
-	01.0				仜	_ Limestone	-
-			0	-	$\vdash$	<ul> <li>51.0-55.9' - moderate yellowish</li> </ul>	-
_				_		brown, (10YR 5/4), very fine to fine	_
	]		4	52.3, 52.5' - Bedding plane or mechanical -	ш	grained, moderate HCl reaction, very - weak to weak (R1 to R2), voids	
1 -	]		4	break, <10 deg, rough, undulating, <1/8"	$\vdash$	(<1/16") over 80-90% of rock	]
-	R3-NQ			open	亡	surface, moderately to highly	-
-	5 ft	84	2	52.85' - Fracture or mechanical break, 50	₽	<ul> <li>fossiliferous with molds up to</li> </ul>	-
-	98%			deg, rough, undulating, tight	$\vdash$	1/2"x1/4", extremely weak at	_
	]		2	53.0' - Bedding plane or mechanical break, 35 deg, rough, undulating, tight	广	52.0-52.5'	
55				53.2' - Fracture or mechanical break, 20 deg,	$\vdash$		]
-12.9				rough, undulating, tight	仜	_	R3: 8 minutes
-			2	53.3' - Fracture or mechanical break, 50 deg,	$\vdash$	-	-
-	56.0		NR.	rough, undulating, tight 53.45, 53.6' - Mechanical break	ҥ	No Recovery 55.9-56.0'	_
	]		1	53.45, 53.6 - Mechanical break 54.25' - Fracture or mechanical break, 60		Limestone	
1 -				deg, rough, undulating, tight	$\vdash$	56.0-60.5' - moderate vellowish	]
-				55.4' - Fracture or mechanical break, <10	Ľ	brown, (10YR 5/4), very fine to fine	-
-			5	deg, rough, undulating, tight	仜	grained, moderate to strong HCl	-
-				55.7' - Bedding plane or mechanical break, <10 deg, rough, undulating, 1/8" infilling,	$\vdash$	reaction, weak to medium strong (R2 to R3), voids (<3/16") over 80-90% of	
I _	R4-NQ 5 ft	67	1	sand infilling, open	广	rock surface, moderately to highly	
	90%	U/		56.55' - Fracture or mechanical break, 30	$\vdash$	fossiliferous, with fossil molds	]
-				deg, rough, undulating, tight	ш	- 1/2"x1/4", extremely weak to very	
-			2	57.25, 57.35, 57.5, 57.55, 58.0, 58.4' - Bedding plane or mechanical break, <10 deg,	$\vdash$	weak at 57.25-57.55' and 59.95-60.5'	
60 -17.9				rough, undulating, <1/4" open	╀	_	D4: 40 minutes —
-17.9	]		2	59.25' - Bedding plane or mechanical break,	ш	_	R4: 10 minutes
1	61.0		NR	<10 deg, smooth, undulating, <1/4" open	$\vdash$	No Recovery 60.5-61.0'	]
-				59.95' - Bedding plane or mechanical break, horizontal, rough, undulating, <1/2" open	Ľ	-	
-			1	60.2, 60.45' - Bedding plane or mechanical	仜	-	
-				break, <10 deg, rough to smooth, undulating,	$\vdash$	-	
	]		1	1/4" open	广	_	
				61.8' - Fracture or mechanical break, 30 deg,	Щ		]
-	R5-NQ			rough, undulating, sandy or fragmented -	b	<del>-</del>	-
-				infilling, 1/2" to 1/4" open	F	_	
					1		



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

CORING	METHOD AI	ND E	QUIPN	IENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW	casing		ORIENTATION : Vertical
WATER	LEVELS: 1.3	ft bg	s on 3/	11/07 START : 3/10/2007 END : 3/	12/200	7 LOGGER : R. Bitely, C. Wallestad	l, N. Jarzyniecki
>00	<u>.</u>			DISCONTINUITIES	ტ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 65_ -22.9	5 ft 84% 66.0	74	1 1 1 NR	62.5' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/2" to 1/4" open 63.45' - Mechanical break 63.7-64.0' - Fracture or mechanical break, <10 deg, rough, undulating, rock fragment infilling, 3-1/2" open 64.65' - Bedding plane or mechanical break,		Limestone  - 61.0-65.2' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate HCl reaction,  - extremely weak to very weak (R0 to R1), voids to 1/16" over <15% of rock surface from 61.0-61.6', voids to - 3/16" over 10% of rock surface in	R5: 12 minutes
			2	horizontal, smooth, undulating, 1/8" open 65.05' - Bedding plane or mechanical break, <10 deg, rough, undulating, 1/8" open		mottled patterns from 61.6-63.4', mottling decreasing with depth, voids to 1/16" covering <5% of rock	-
_			0	66.3' - Fracture or mechanical break, 60 deg, rough, undulating, tight 66.8' - Bedding plane or mechanical break,		surface from 64.0-65.2', poorly to moderately fossiliferous with molds to 1/2"x1/8", solution	_
_	R6-NQ 5 ft 100%	98	1	horizontal, rough, undulating, tight 68.45' - Bedding plane, horizontal, smooth, undulating, tight	日	cavities/bioturbation at 63.45', weak to medium strong at 62.5-64.3' No Recovery 65.2-66.0'	-
70			0	70.0' - Bedding plane or mechanical break,	Ħ	Limestone 66.0-71.0' - pale yellowish brown, (10YR 6/2), mild to moderate HCl	R6: 9 minutes
_	71.0		1	horizontal, smooth, undulating, tight 70.2, 71.0' - Mechanical break	H	reaction, very weak to medium  strong (R1 to R3), voids (1/6") over  30-70% of rock surface, poorly fossiliferous, trace molds, trace	
-			1	71.55' - Fracture, 25 deg, rough, stepped, 1/4" open		cavities to 3/4"x1/4" some cavities with secondary infilling, laminated bedding with organics from 67.3-67.7	- -
-	R7-NQ		3	72.4' - Fracture, 60 deg, smooth, undulating, tight 72.65' - Fracture or mechanical break, 20	Ħ	71.0-72.9' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine to fine grained, moderate HCl	- Driller's Remark: Silt seam
-	5 ft 74%	53	NR 0	deg, rough, undulating, tight 72.8' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight	H	reaction, extremely weak to medium strong (R0 to R3), voids (3/16") over 20-80% of rock surface, moderately	from 72.9-73.9' based on drilling speed and circulation Driller's Remark: 30% loss
75_ -32.9	70.0		4	72.9-73.9' - Clay seam, driller reports soil horizon		fossiliferous with fossil molds, trace secondary infilling of cavities, mottled No Recovery 72.9-73.9'  Limestone	of circulation fluids at approximately 74'
_	76.0		NR 1	75.15, 75.25' - Bedding plane, horizontal, smooth, undulating, tight 75.5, 75.55' - Bedding plane or mechanical break, horizontal, smooth to rough,		73.9-75.7' - Same as 71.0-72.9' No Recovery 75.7-76.0' Limestone 76.0-76.9' - light olive gray, (5Y 5/2),	-
_			0	undulating, tight 76.9' - Bedding plane or mechanical break, <10 deg, rough, undulating, open 1"		very fine to fine grained, moderate  HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over	-
-	R8-NQ 5 ft 49%	27	0	77.1' - Fracture, 70 deg, rough, undulating, 1/2" open 77.3-77.5' - Clay seam 77.75, 77.85, 77.9, 78.05' - Bedding plane,	日	10-90% of rock surface, cavities to 2"x1/8" 76.9-77.3' - yellowish gray, (5Y 7/2), very fine to fine grained, extremely	-
80 -37.9	81.0		NR	horizontal, smooth, undulating, tight		weak (R0), voids (1/6") covering 75% of rock surface  Fat Clay To Highly Plastic Silt (CH) 77.3-77.5' - moderate HCl reaction  Limestone	R8: 9 minutes
_			2	81.35, 81.4' - Fracture or mechanical break, <10 deg, smooth to rough, undulating,		77.5-78.1' - Same as 76.9-77.3' 78.1-78.45' - Same as 76.0-76.9' No Recovery 78.45-81.0'	SC-1 collected at 81.4- 82.4'
			1	organic staining over 50-80% of surface, <1/2" open 82.7, 83.25, 83.4' - Mechanical break			- - -
	R9-NQ				H		
1			1 1		1		l



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 1.3	ft bg	s on 3/	11/07 START : 3/10/2007 END : 3/	12/200	D7 LOGGER : R. Bitely, C. Wallesta	d, N. Jarzyniecki
₹ 🗅 হ	(%			DISCONTINUITIES	၂ ၂	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A A CE	I.R.U TH,	(%)	T.00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	lo l	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EV.	ORE	ΩD	ZAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
		Ω.		THICKNESS, SURFACE STAINING, AND HIGHTINESS	Ś		
_	5 ft 98%	84	2	83.6, 83.7' - Bedding plane, rough, undulating	Н	Limestone - 81.0-85.35' - yellowish gray to very	_
			0		ш	light gray, (5Y 7/2 to N8), very fine to	_
85			١			fine grained, weak to medium strong	
-42.9			. 10	_	Н	— (R2 to R3), extremely weak at 83.6-83.7', laminated from 81.0-81.4',	R9: 12 minutes
_	86.0		>10	85.55-85.9' - Fracture zone, rough,	Ш	voids (<1/16") over 30% of rock	1
-	00.0		NR/	undulating to stepped	Н	<ul> <li>surface, organics rare from 81.35-81.4', secondary infilling of</li> </ul>	-
-			>10	86.0-86.3 - Fracture zone, rough, undulating to stepped, intersecting fractures	ш	very fine grained matrix from	-
-				86.8-87.0' - Bedding plane, <10 deg, 1/2" clay	Н	- 81.4-83.6', fossiliferous with molds	-
_			1	infilling, 1/2" open	П	up to 1/2"x1/4" with some secondary infilling, cavities up to 3" with	-
-				87.6' - Bedding plane, <10 deg, smooth, undulating, 1/4" open	世	<ul> <li>secondary infilling, voids (3/16") over</li> </ul>	
_	R10-NQ 5 ft	64	0	<b>.</b> .	Ш	80-90%, organics, fossiliferous, and	]
	86%	<b>U</b> T		88.5' - Mechanical break	Ш	cavities up to 1-1/2", possible bioturbation at 81.4-83.6'	
]			- 40		H	85.35-85.9' - Same as 81.0-85.35'	]
90			>10	89.7-90.3' - Fracture zone, rough, undulating,	ш	except extremely weak to very weak	_
-47.9			>10	intersecting fractures	╁┼	(R0 to R1), molds up to 1"x1/4" with some secondary infilling, cavities up	R10: 7 minutes
-	0.4.0		NR		ш	to 1-1/2"x1/2", trace organics	-
-	91.0				+	_ No Recovery 85.9-86.0' Limestone	End drilling for the day
-			0		$\Box$	86.0-87.0' - Same as 85.35-85.9'	3/10/07 at 91.0'
-					oxdot	except fat clay (CH) to elastic silt	Resume drilling on 3/11/07
_			1	92.0, 94.3' - Mechanical break	ш	(MH) seams at 86.8' and 87.5', secondary infilling of cavities at	at 91.0', water level is 1.3' below ground surface
l _			·	92.8' - Bedding plane or mechanical break,	Ш	86.65-86.8', cavities up to 1-1/2"x1/2"	_
	R11-NQ		0	<10 deg, smooth, undulating	Н	87.0-87.65' - yellowish gray, (5Y 7/2),	
	5 ft 100%	76	U	93.5' - Mechanical break	Ħ	<ul> <li>very fine to fine grained, extremely weak (R0), fossil molds up to</li> </ul>	]
				94.05, 94.5' - Bedding plane or mechanical	Н	1/2"x1/4", cavities few, some	1
95			4	break, <10 deg, rough, undulating	ш	<ul> <li>secondary infilling</li> <li>87.65-90.3' - light olive gray to dark</li> </ul>	1
-52.9				94.65' - Fracture, smooth, undulating, 1/4" open		yellowish brown, (5Y 5/2 to 10YR	R11: 24 minutes
-			>10	94.75' - Fracture, 50 deg, infilling, up to 1/2"	╁┼	- 4/2), very fine to fine grained, very	-
-	96.0			open 95.1-96.0' - Fracture zone, intersecting		weak to medium strong (R1 to R3), voids (<3/16") over 60% of rock	SC-2 collected at 96.0-
-			0	fractures	╀┦	<ul> <li>surface, cavities few (up to 1/2"),</li> </ul>	97.0' -
-					Ш	trace organics, possible bioturbation,	
			0	97.05, 99.5, 96.0-96.2' - Mechanical break		very fossiliferous, molds and casts  up to 1/4"x1/2"	]
					Ħ	No Recovery 90.3-91.0'	
	R12-NQ		4			Limestone - 91.0-93.0' - dusky yellow, (5Y 6/4),	
]	5 ft 100%	87	1	98.7' - Mechanical break, 50 deg, rough,	Ш	very fine to fine grained, very weak to	]
				stepped	Ш	medium strong (R1 to R3),	1
100			1		+	<ul> <li>fossiliferous with casts up to 3/4"x1/2", voids (3/16") over 30% of</li> </ul>	
-57.9				99.9' - Bedding plane, <10 deg, smooth,	口	rock surface, cavities up to 1/2"x1/4"	R12: 10 minutes
-			5	undulating, up to 1/4" open 100.35, 100.4' - Fracture, <10 deg, rough,	ᡛᡰ	over 15% of rock surface, yellowish	-
-	101.0			undulating, up to 1/4" open	Ш	gray (5Y 7/2) secondary infilling up to 2"x2" with trace voids (1/16"), trace	-
-			1	100.55-101.0' - Fracture zone, 80-85 deg,	Ш	organics	
				rough, undulating, fracture interval separated by bedding plane fractures	H	_	
			1	100.7-100.9' - Fracture zone or bedding		_	
]			'	plane, rough, undulating	$\vdash \vdash$		]
]	R13-NQ			101.2, 103.3, 103.5, 103.6, 104.4' - Mechanical break	Ш		]
					1		
							1



PROJECT NUMBER:	BORING NUMBER:					-
338884.FL	A-03	SHEET	7	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				144/07 OTABL 0/40/0007 FND 0		•	I N. Leaveland
WATER	LEVELS : 1.3	tt bg	s on 3		12/20		
<b>≥</b> 5€	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	8	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	ZAN. YAN.	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A TIC	E RU STH, SVE	(%) O	TOO!	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30L	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
ERS -	ORE	Ø	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	¥	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
Оνш	ა⊐ <u>ო</u> 5 ft	<u>⊬</u>			S		
_	100%	90	0	101.3' - Fracture, 50 deg, rough, undulating 102.5' - Mechanical break, <5 deg, rough,	╨	93.0-96.0' - yellowish gray, (5Y 7/2), - weak to medium strong (R2 to R3),	_
			1	undulating		voids over <10% of rock surface	
105			1	· ·	┰	increasing to 30% from 93.65-94.35',	1
-62.9				104.95' - Bedding plane, rough, undulating	T	<ul> <li>fossiliferous with molds/casts up to 1/2"x1/4", possibly bioturbated from</li> </ul>	R13: 8 minutes
-	4000		0		╁	93.65-94.35'	-
-	106.0					- Limestone	-
_			0	106 F 109 2 100 2! Machanical brook	+	96.0-101.0' - yellowish gray, (5Y 7/2), very fine to fine grained, very weak to	-
_				106.5, 108.3, 109.2' - Mechanical break	$\perp$	- medium strong (R1 to R3), voids	_
_			1	107.35' - Bedding plane, <15 deg, rough,	廾	(3/16") over 35% of rock surface	
			'	undulating, 1/4" open	Ш	decreasing to 15-20% at 99.8', fossiliferous with casts/molds up to	
	R14-NQ			108.1, 108.6, 108.8' - Bedding plane, 10 deg,	$\perp$	1/2"x1/4", organics visible in solution	1
-	5 ft 100%	87	3	smooth to rough, undulating, tight to up to	1	cavities at 98.4-98.6', secondary	1
-	100 /0			1/8" open at 108.8'		<ul> <li>infilling with voids over &lt;10% of surface and with trace fossils</li> </ul>	-
-			1		₩	101.0-106.0' - yellowish gray, (5Y	-
110 -67.9				109.75' - Mechanical break, 10-15 deg,	桖	7/2), very fine to fine grained, weak	SC-3 collected at 109.75-
-07.9			3	rough, undulating	ᅪ	to very weak (R2 to R1), voids over 20-30% of rock surface, fossiliferous	110.65' R14: 5 minutes
_	111.0			110.65, 110.85, 110.95' - Bedding plane, <10	上	with casts up to 1"x1/2", fossils and	K14. 5 Itililiates
			ا ا	deg, rough, undulating, up to 1/4" open	$\vdash$	voids increase from zone at	
			3	111.05' - Fracture zone, rough, undulating, intersecting fractures	Ҵ	102-103.5', clay infilling over 5% of voids, secondary infilling of yellowish	1
_				111.7, 112.1, 115.15-115.2, 115.85' -	╁	gray (5Y 8/1) limestone with <10%	1
-			0	Mechanical break	亡	voids and fossils; sparsely	-
-	R15-NQ			440 4 440 05 440 45 440 55 440 7 440 0	╫	fossiliferous from 101-102.5' with 15-25% voids on rock surface	-
-	5 ft	89	6	113.1, 113.35, 113.45, 113.55, 113.7, 113.8, 114.1, 144.3, 144.35, 114.75, 114.85' -	┰	106.0-106.9' - light olive gray to	-
_	100%			Fracture zone or bedding plane, <10 deg,	$\pm$	yellowish gray, (5Y 5/2 to 5Y 7/2),	-
_			5	smooth to rough, undulating, up to 1/8" open,	$\vdash$	very fine to fine grained, very weak (R1), voids (1/16") over 20% of rock	_
115				healed fracture at 119.6'		surface, fossiliferous with	
-72.9					$\vdash$	molds/casts up to 1"x1/2", laminar	R15: 9 minutes
_	116.0		1	115.5' - Bedding plane, <10 deg, smooth to	世	<ul> <li>bedding planes</li> <li>106.9-111.0' - yellowish gray, (5Y</li> </ul>	]
1 -				rough, undulating, up to 1/8" open 116.1, 116.45, 116.55' - Bedding plane, <10	1—	5/2), very fine to fine grained, very	1
-			3	deg, smooth to rough, undulating, up to 1/4"	亡	- weak to weak (R1 to R2), voids	-
-				open	╁	(3/16") over 25-30% of rock surface, fossiliferous with fossils up to	-
-			0		厂	<ul> <li>1/4"x1/4", possible dissolution</li> </ul>	-
-					+	cavities up to 1/2"x1/2"	-
-	R16-NQ 5 ft		0	118.5, 118.45, 116.75, 119.8, 120.9' -	阜	111.0-119.0' - yellowish gray, (5Y 7/2), very fine to fine grained, very	
	100%	-	لــّــا	Mechanical break	╨	weak (R1), voids (<1/16") over	
1				110.21 Rodding plans, recent conducting		10-30% of rock surface, voids with secondary infilling over additional	]
120			1	119.3' - Bedding plane, rough, undulating, ground rock infilling, up to 1/2" open	$\Box$	25% of rock surface, secondary	1
-77.9					+	infilling is yellowish gray (5Y 8/1)	R16: 6 minutes
-			2	120.6' Rodding plane, rough undulating	世	119.0-121.0' - yellowish gray, (5Y 7/2), very fine to fine grained, weak	-
-	121.0			120.6' - Bedding plane, rough, undulating 120.95' - Fracture or mechanical break,	$+$ $\square$	(R2), voids (3/16") over 30% of rock	-
-			1	rough, undulating, high angle fracture	上	surface, highly fossiliferous, with	-
-				121.35' - Bedding plane, 15 deg, rough,	_	fossils up to 1/2"x1/4", dissolution cavities up to 1/4" in diameter over	
I _			2	undulating, 1/2" open 122.0' - Bedding plane, rough, undulating to	片	_ 15% of rock surface	]
				stepped, tight	$\vdash$	-	]
_	R17-NQ						]
					1		
1			ı				



ſ	PROJECT NUMBER:	BORING NUMBER:					
1	338884.FL	A-03	SHEET	8	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 1.3	ft ba	s on 3	/11/07 START : 3/10/2007 END : 3/	12/200	D7 LOGGER : R. Bitely, C. Wallesta	d, N. Jarzyniecki
				DISCONTINUITIES		LITHOLOGY	COMMENTS
AND N (#)	Z & N N N N N N N N N N N N N N N N N N N		LES L	DESCRIPTION	CLOC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	5 ft 100%	88	1	122.9' - Fracture, 55 deg, smooth to rough,	ш	Limestone	
	100 /0			undulating, up to 1/4" open 123.4' - Bedding plane, smooth to rough,	ш	<ul> <li>121.0-126.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 6/1), very</li> </ul>	1
125			0	undulating, up to 1/2" open 123.5, 123.7, 124.15, 125.7' - Mechanical —		fine to fine grained, voids (3/16")  over 30% of rock surface, secondary	1
-82.9			1	break 123.7, 124.15, 125.7 - Wechanical —		infilling with yellowish gray (5Y 8/1) to	R17: 11 minutes
_	126.0		'	125.75' - Fracture, 55 deg, rough, undulating		medium gray (N5) limestone, voids increase to 40-50% at 123.8-124.0	
_			>10			and 125.2-126.0', fossiliferous with	
_			- 10	126.9-126.95' - Fracture zone, intersecting		highly fossiliferous zones at - 121.0-122.2', 123.8-124.2' and	
_			1	fractures, up to 1/4" open		125.2-126.0' (casts/molds),	
_			-	127.4' - Bedding plane, rough, undulating, up to 1/4" open	Ш	dissolution cavities at 121.8' and 122.1' up to 1"x1/2", smaller	_
_	R18-NQ 5 ft	98	2	127.5, 130.15, 130.9' - Mechanical break	₽	dissolution cavities throughout, laminar bedding at 122.9'	_
-	100%			128.4, 128.7' - Bedding plane, tight to 1/4" open	$\perp$	_ 126.0-127.1' - Same as 121.0-126.0'	-
-			0		$\perp$	except very weak to weak (R1 to R2), voids decreasing with depth	-
130_ -87.9				_	口	127.1-131.0' - yellowish gray, (5Y 7/2; 5Y 8/1), very fine to fine grained,	R18: 7 minutes
-			0		一	very weak (R1), voids (1/16") over	SC-4 collected at 130.15-
-	131.0					<ul> <li>10% of rock surface becoming infilled with depth, laminar bedding,</li> </ul>	131.1'
-			0			fossiliferous with some fossils up to	-
-				131.95, 133.3, 134.35, 135.5' - Mechanical	+	_ 1/4" in diameter, trace cavities 131.0-134.8' - yellowish gray to	-
-			2	break 132.4, 132.9' - Fracture, 40 deg, smooth to	Ħ	dusky yellow, (5Y 7/8 to 5Y 6/4), very fine to fine grained, very weak to	-
_	R19-NQ			rough, undulating		weak (R1 to R2), voids (1/8") over	1
	5 ft 100%	94	4	133.45' - Bedding plane, <5 deg, smooth, undulating		<ul> <li>10-30% of rock surface increasing with depth, fossiliferous as</li> </ul>	-
			0	133.55' - Fracture, 80 deg, rough to smooth,		casts/molds, fossils more abundant	
135_			U	undulating, tight		at 132.7-133.2', laminar bedding planes	
-92.9			0		Н	134.8-136.0' - yellowish gray, (5Y - 7/6), very fine to fine grained, weak	R19: 8 minutes
_	136.0		Ů	135.5, 133.6' - Fracture, 75 deg and 80 deg, rough to smooth, undulating, fractures	$\mathbf{H}$	(R2), voids (3/16"), fossiliferous	
-			4	intersect at 133.55'	戸	(casts), dissolution cavities at - 134.9-135.2' (1"x1/2")	] _
-				136.05' - Bedding plane, 40 deg, rough to smooth, undulating	Щ	136.0-141.5' - yellowish gray and light olive gray, (5Y 7/2 and 5Y 5/2),	-
-			>10	136.35, 136.7, 136.85' - Bedding plane, 40 deg, rough to smooth, undulating, up to 1/4"	口	<ul> <li>very fine to fine grained, very weak to</li> </ul>	-
-	R20-NQ			open	$\perp$	weak (R1 to R2), voids (1/16") over 10% of rock surface increasing to	-
-	5 ft	69	2	136.45, 137.1, 137.75, 139.0' - Mechanical break		- 1/8" at 138.7' covering 25:% of rock	-
-	100%			137.3-137.75' - Fracture zone or bedding plane, multiple high angle intersecting	+	surface, dissolution cavities up to 1/4" with some secondary calcite	-
140			1	fractures	+	<ul> <li>mineralization, poorly fossiliferous, laminar bedding</li> </ul>	-
-97.9				138.2, 138.5, 139.2' - Bedding plane, 40 deg, — rough to smooth, undulating, up to 1/4" open	Ħ	ai bodding	R20: 8 minutes
1 -	141.0		3	140.0, 140.3' - Fracture (2), 60 deg and 65	Ħ	_	Driller's Remark: 100%
1 -	171.0			deg, rough, undulating, up to 1/4" open 140.7' - Bedding plane, <10 deg, smooth,	Ħ	-	loss of circulation fluids at - 140'
1 -			1	undulating, up to 1/2" open 141.3, 141.95, 145.9' - Mechanical break	$\boxminus$	-	1
1 -				141.45' - Bedding plane, <10 deg, smooth,	Ш	_	SC-5 collected at 141.85 142.9'
1 -			0	undulating	Н		]
	R21-NQ				$\square$		
1							



PROJECT NUMBER:						
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				EINT . Dietrich D-50 5/N 252, Hidd Totally, NQ 10015, HW			
WATER	LEVELS : 1.3	tt bgs	s on 3		12/200		
ŞQ₽	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	ე	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	ANE ₹	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A A B B A T I C A T I	TH,	(%) <sub>Q</sub>	TUF:	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	9	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
F 두 및	ORE SNG SCO	Oρ	SAC ER F	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SE		R		THICKNESS, SURFACE STAINING, AND TIGHTNESS	ŝ	CHARACTERISTICS	21.01 0, 1201 N200210, 210.
	5 ft 91%	53	>10	143.0' - Bedding plane, <10 deg, smooth to	$\Box$	Limestone	
_	9170			rough, undulating, up to 1" open 143.3' - Bedding plane, <10 deg, some	$\top$	<ul> <li>141.5-143.1' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very</li> </ul>	-
			>10	recrystallization on 20% of surface		fine to fine grained, very weak to	1
145_ -102.9				143.5-144.6; 145.05-145.55' - Fracture zone, —	╀┤	— weak (R1 to R2), voids over 20% of	R21: 22 minutes —
102.0			>10	intersecting fractures		rock surface, cavities over 10% of	NZ1. ZZ IIIIIutes
l .	146.0		NR		$\bot$	rock surface up to 1-1/3"x3/4", most voids and cavities infilled with	
				146.1-146.15' - Fracture zone, open		medium gray (N6) material,	
_			4	146.3' - Bedding plane, <10 deg, smooth to	Н	fossiliferous (as casts)	1
-				rough, undulating to planar, organic staining on fracture face, up to 1/2" open	ш	<ul> <li>143.1-145.55' - yellowish gray to very light gray, with light olive grey</li> </ul>	1
-			3	146.9, 147.4' - Fracture, 50 deg	+	mottling, (5Y 7/2 to N8, with 5Y 5/2),	1
-	500.110			147.55' - Bedding plane, <10 deg, 1/4" open		<ul> <li>very fine to fine grained, weak to</li> </ul>	_
I -	R22-NQ 5 ft	71	2	147.9' - Bedding plane, 10-15 deg, up to 1" open	H	medium strong (R2 to R3), voids	]
	80%	, ,	_	148.4, 149.0' - Bedding plane, <10 deg, up to		over 15% of rock surface, dissolution cavities up to 1/2" in diameter,	
				1/2" open	$\vdash$	fossiliferous (as casts)	1
150			1			No Recovery 145.55-146.0'	1
-107.9				_	ш	<b>Limestone</b> 146.0-147.2' - Same as	R22: 25 minutes
-			NR		$+ \Box$	140.0-147.2 - Same as 143.1-145.55' except laminar beds	-
_	151.0					up to 4" thick, trace to 20% voids	_
_			4	151.05' - Fracture, 20 deg, up to 1/2" open	╟	over rock surface, trace organics	
			7	151.65, 151.8, 151.9' - Bedding plane, <20		<ul> <li>147.2-150.0' - dusky yellow to very</li> <li>pale orange, (5Y 6/4 to 10YR 8/2),</li> </ul>	
-				deg, up to 1/2" open	Н	very fine to fine grained, very weak	1
-			1	152.0' - Bedding plane, <5 deg, tight		(R1), voids (<3/16") over 30% of rock	1
-	R23-NQ				₽	surface, dissolution cavities up to 1/4" in diameter, fossiliferous (fossils	-
-	5 ft	71	1		ш	- 1/16"-1" in length), some voids and	-
l _	89%			153.8' - Mechanical break, 50 deg	$\vdash$	_ cavities with dusky yellow (5Y 6/4) to	
						light olive gray (5Y 6/1) secondary	
155			6	154.35-154.6' - Fracture zone or bedding plane, <10 deg, 1/2" open at 156.5	Ш	<ul> <li>infilling</li> <li>No Recovery 150.0-151.0'</li> </ul>	1
-112.9			>10		ш	Limestone	R23: 12 minutes
-			NR	155.4-155.55' - Fracture zone, intersecting	╁┼	- 151.0-152.75' - dusky yellow to light	-
-	156.0		INIX	fractures		gray, (5Y 6/4 to N7), very weak to weak (R1 to R2), voids (up to 1/16")	1 4
-			>10	156.0-156.1' - Fracture zone, open 156.35, 156.45' - Bedding plane, <10 deg,	Щ	over 40% of rock surface, dissolution	]
I _				rough, undulating, up to 1/8" open	Ш	cavities up to 1"x1/2", organic layer	]
I -				156.4' - Fracture, 85 deg, 1/8" open		at 152.0' with very fine grained	1
			1	157.6' - Bedding plane, <10 deg, rough,		<ul> <li>limestone layer with no voids (&lt;1/4" thick)</li> </ul>	1
-	R24-NQ			undulating, 1/4" open	Щ	152.75-155.45' - yellowish gray, (5Y	1 1
-	5 ft		2	158.5-158.8' - Fracture zone, 50 deg, rough,		<ul> <li>7/2), very fine to fine grained, weak</li> </ul>	-
-	92%			undulating, organic staining over 10-20%		(R2), very weak at 154.45-155.4', voids (up to 3/16") over 20% of rock	1 4
I -			6	159.0-159.45' - Fracture zone, rough,	H	- surface, poorly fossiliferous, laminar	]
160				undulating, intersecting fractures, up to 1/4"	Ш	beds	
-117.9			0	open — 159.55, 159.75' - Bedding plane, 10 deg,	$\vdash$	No Recovery 155.45-156.0'	R24: 8 minutes
I -	161.0		NR	rough, undulating, 1/8" open	口	<ul> <li>Limestone</li> <li>156.0-156.45' - Same as</li> </ul>	End drilling for the day
-	161.0		1417	160.5' - Fracture, 50 deg, rough, undulating,	╁┼┤	152.75-155.45' except very weak	03/11/2007, 18:30 at 161.0' -
-			1	1/8" open	口	(R1), laminar organics (<3/4") thick,	Resume drilling on
-				161.55' - Bedding plane, <5 deg, rough to smooth, undulating, up to 1/4" open	H	moderately fossiliferous with casts up to 1/4"x1"	1.0' below ground surface
I _			2	162.05' - Bedding plane, <5 deg, rough to	口	- WT XI	
			4	smooth, undulating, up to 1/8" open	H		1
-	R25-NQ			162.75, 163.75, 164.55' - Mechanical break,	ш	=	1
-				rough, undulating	$+ \exists$	-	1
					1		



PROJECT NUMBER: BORING NUMBER: 338884.FL A-03 SHEET

#### ROCK CORE LOG

10 OF 12

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 1.3 ft bgs on 3/11/07 START: 3/10/2007 END: 3/12/2007 LOGGER: R. Bitely, C. Wallestad, N. Jarzyniecki DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (#) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS 5 ft Limestone 86% 156.45-160.6' - very fine to fine grained, very weak to weak (R1 to R2), alternating laminar beds up to 8" 2 hick defined by changes in voids, voids ranging from <10% up to 30% (up to 1/16"), dissolution cavities at 157.6', 158.45', 158.9', and 159.5' up to 1/2"x1/4" over 15% of rock 165 0 164.95' - Bedding plane, smooth to rough, -122.9 R25: 19 minutes undulating, up to 1/2" open NR 166.0 3 surface, poorly to moderately 166.6, 166.75, 166.8, 167.1, 167.2, 167.4, 167.55, 167.65, 167.7, 167.8, 167.95, 168.10, fossiliferous No Recovery 160.6-161.0' 168.15, 168.2, 168.35, 168.45, 168.50, 169.9, 8 Limestone 170.0' - Bedding plane or mechanical break, 161.0-165.3' - light olive gray to <5 deg, smooth, undulating to planar, open up to 1/4" R26-NQ yellowish gray, (5Y 5/2 to 5Y 7/2), very fine to fine grained, voids (up to 6 5 ft 38 SC-6 collected at 168.6-85% 3/16") over <10% of rock surface, 169 6' fossil casts over <10% of rock 1 surface, laminar bedding 170 characterized by color change and % voids, trace organics, highly fossiliferous from 162.05-163' with -127 9 R26: 15 minutes NR 171.0 increase in voids (up to 1/4") over 35% of rock surface, some 3 secondary infilling of voids with 171.55' - Bedding plane or mechanical break, horizontal, rough, undulating, tight 171.8' - Bedding plane, 20 deg, smooth, undulating, <1/8" open 171.95-172.25' - Fracture zone, <5 deg, yellowish gray (5Y 7/2) to gray (N7) limestone 9 No Recovery 165.3-166.0' **Limestone** 166.0-168.7' - yellowish gray to R27-NQ rough to smooth, undulating, up to 1/4" open 172.4' - Fracture, 80 deg, rough to smooth, 5 ft 34 3 moderate olive brown, (5Y 7/2 to 5Y 97% 4/4), very fine to fine grained, weak to medium strong (R2 to R3), extremely weak (R0) to very weak rock (R1) at discontinuities, voids (<3/16") over 60-80% of rock undulating, recrystallization on fracture surface 4 172.6' - Bedding plane, smooth to rough, 175 undulating, silt-sized infilling, organic -132<u>.9</u> R27: 6 minutes staining, up to 1/4" open 172.9, 172.95, 173.1, 173.5, 174.0, 174.35, 174.65' - Bedding plane or mechanical break, <5 deg, smooth, undulating surface, several cavities (>5) from 1/4"-1/8" on bedding laminations, 5 176.0 NR poorly fossiliferous 168.7-170.25' - Same as 1 174.5' - Bedding plane or mechanical break, 166.0-168.7' except mild to moderate 35 deg, smooth, undulating 175.0, 175.25-175.35, 175.55, 175.65, HCI reaction, moderately to highly 5 fossiliferous (casts/molds), trace 175.75' - Bedding plane or mechanical break, rough, undulating, <1/2" open, friable from bedding plane laminations, trace secondary infilling of fossil molds at R28-NQ 175 25-175 35' 169.8-169.9' 7 5 ft 32 176.95' - Bedding plane or mechanical break, 91% No Recovery 170.25-171.0' 20 deg, smooth to rough, undulating Limestone 177.25, 177.3' - Bedding plane or mechanical 171.0-175.85' - light olive gray to >10 break, 10 deg, smooth, undulating pale yellowish brown, (5Y 5/2 to 180 178.7, 178.8' - Bedding plane, <10 deg, 10YR 6/2), very fine to fine grained, extremely weak to weak (R0 to R2), weakest along bedding plane -137<del>.</del>9 R28: 19 minutes rough, undulating, up to 1/4" open 178.75' - Fracture, 60 deg and 65 deg 3 NR 178.95' - Bedding plane, <10 deg, rough, undulating, up to 1" open 179.2-179.25' - Fracture zone, rough, 181.0 fractures, voids (<3/16") over 50-80% of rock surface, laminated 2 bedding at 171.8', 172.9' and undulating, 1/2" open 179.3' - Bedding plane, <5 deg, smooth to 174.8-175.05', several cavities (<1/2") over 20% of rock surface, rough, planar 179.45' - Bedding plane or mechanical break, 3 poorly fossiliferous No Recovery 175.85-176.0' R29-NQ smooth to rough, 1/2" to 1/4" open



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-03	SHEET	11	OF	12

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 1.3	3 ft bg	s on 3	/11/07 START : 3/10/2007 END : 3/	12/20	07 LOGGER : R. Bitely, C. Wallesta	d, N. Jarzyniecki
≥ ∩ ⊕	(9			DISCONTINUITIES	ڻ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	I RU	RQD(%)	17. 10.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
FEN	ENG E	g	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	₹	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ООШ	5 ft	54	>5	179.5, 179.65, 179.8, 179.85, 179.95, 180.0,	S	Limestone	
_	88%	•		180.1, 180.15' - Bedding plane, <10 deg,	丰	- 176.0-178.5' - pale yellowish brown	-
-			4	smooth to rough, undulating, up to 1/2" open	╀	to very light gray, (10YR 6/2 to N8),	-
185				179.6-179.8' - Fracture zone, rough, undulating –	₽	very fine to fine grained, weak to medium strong (R2 to R3), voids	
-142.9 -			0	181.3, 181.35' - Bedding plane or mechanical	上	(<3/16") over 60-80% of rock	R29: 15 minutes
l _	186.0		NR	break, horizontal, rough, undulating, 1/4" open	╁┼	surface, dissolution cavity at 179.3' - (1-1/2"x1"), few fossil molds	
_			1	181.45-181.6' - Fracture zone, 0-55 deg,	F	178.5-178.7' - Same as 176.0-178.5'	SC-7 collected at 186.0- 186.75' -
			'	rough, undulating, intersecting fractures 182.75, 182.9, 183.0, 183.05, 183.35, 183.4,	片	except medium strong (R3), voids (<1/16") over 0-30% of rock surface,	100.73
			5	183.45, 184.2, 184.3' - Bedding plane or	$\vdash$	trace mottling	
			5	mechanical break, smooth to rough, undulating, friable zones at 183.0-183.5'	П	178.7-179.0' - Same as 176.0-178.5' 179.0-179.5' - Same as 178.5-178.7'	_
-	R30-NC		_	186.75, 187.05' - Bedding plane or	Т	179.5-180.55' - Same as	<u> </u>
-	5 ft 100%	56	5	mechanical break, <10 deg, rough, undulating, <1/4" open	╁	176.0-178.5' No Recovery 180.55-181.0'	_
-				187.2, 187.35, 187.75, 187.9, 188.1, 188.45,	F	Limestone	-
190			3	188.65, 188.75' - Bedding plane, <10 deg,	世	181.0-185.4' - pale yellowish brown,	-
-147.9	1			rough to smooth, undulating, with some <1/4" _ open	╁	(10YR 6/2), very fine to fine grained, very weak to medium strong (R1 to	R30: 18 minutes
-	191.0		4	189.25' - Fracture, 50 deg, smooth,	┰	R3), with extremely weak (R0) and	-
-	131.0			undulating 189.65, 189.75, 190.4, 190.55, 190.75' -	仜	friable silty lens, voids (<3/16") over 60% of rock surface, few cavities	-
-	-		3	Bedding plane, <10 deg, rough to smooth,	╁	(3/4"x1/4") poorly fossiliferous with	-
-	1			undulating, <1/8" open 191.1, 191.35, 191.7' - Fracture, <10 deg,	┰	_ few casts/molds, bioturbated, friable lens at 184.55-184.6'	-
-			2	rough, undulating	亡	No Recovery 185.4-186.0'	-
-	R31-NC	] )		192.15' - Mechanical break 192.85, 193.0-193.1' - Fracture zone, rough,	世	Limestone 186.0-191.0' - pale yellowish brown	-
-	5 ft	62	3	undulating, <1/2" open	╁┼	to moderate yellowish brown, (10YR	-
-	99%			193.45, 193.6' - Mechanical break 193.75, 193.95, 194.1' - Bedding plane or	┲	6/2 to 10YR 5/4), very fine to fine grained, weak to medium strong (R2	-
405			3	mechanical break, <10 deg, rough,	仜	to R3), voids (<3/16") over 70-80% of	-
195 <u>-</u> -152.9	-			undulating to stepped 194.55' - Mechanical break, 40 deg	+	rock surface, moderately to highly fossiliferous especially at	R31: 10 minutes
-			1	194.75-194.9' - Fracture zone, rough,	F	– 186.0-186.75' (molds/casts),	-
-	196.0		NR/	undulating 195.6-195.8' - Fracture, rough, undulating, 2"	世	laminated bedding over 50% of rock surface	-
-	-		3	fragment missing over 180 degrees of core	₽	<ul> <li>191.0-193.0' - moderate yellowish</li> </ul>	-
-	-			section 196.45' - Bedding plane, horizontal, rough,	+	brown to yellowish gray, (10YR 5/4 to 5Y 7/2), fine grained, very weak to	-
-	1		>10	undulating, silt and/or clay sized infilling, 1/2"	$\perp$	<ul><li>weak (R1 to R2), voids (&lt;3/16") over</li></ul>	-
-		ĺ		open 196.9-197.45' - Fracture zone, rough,	士	80% of rock surface, dissolution cavities (<1-1/2" diameter),	-
-	R32-NC 5 ft	40	3	undulating	+	<ul> <li>laminated over 30% of rock surface,</li> </ul>	-
-	84%			198.55' - Bedding plane, horizontal, rough, undulating, 1/4" silt infilling	丰	highly fossiliferous 193.0-194.0' - Same as 191.0-193.0'	-
-			>10	198.8, 198.85, 199.15' - Bedding plane, <10	片	<ul><li>except very weak (R1), voids</li></ul>	-
200	1			deg, rough, undulating, <1/4" open 199.4-199.65; 199.95-200.1' - Fracture zone,	╨	(<1/16") over 40% of rock surface, few dissolution cavities (<1/2"x1/8")	
-157 <u>.</u> 9	]		>10 NR	rough, undulating to stepped	耳	194.0-195.95' - Same as	R32: 11 minutes
_	201.0		INIX	199.65-199.95' - Fracture zone, smooth to	上	191.0-193.0' except voids (<3/16") over 30-80% of rock surface, fossils	Total depth of boring is 201.0'
_				\intersecting bedding plane at 199.8', tight	1	decreasing with depth, highly	-
l -					1	fossiliferous with casts/molds and 2" diameter dissolution cavities at	_
-	]				1	_ 195.6-195.8'	_
-	]				1	No Recovery 195.95-196.0'	_



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-03	SHEET	12	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723884.4 N, 457671.8 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews, P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 1.3	3 ft bgs	s on 3/	/11/07 START : 3/10/2007 END : 3/1	2/20	D7 LOGGER : R. Bitely, C. Wallesta	d, N. Jarzyniecki	
>00	(9			DISCONTINUITIES	G	LITHOLOGY	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft) CORE RUN, LENGTH, AND RECOVERY (%)			ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,_	SIZE AND DEPTH OF CASING,	
H BE ATIC	E RU SITH,	Q D (%)	TUR 100-	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	3OLI(	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD	
EV EV	SORE	RQD	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.	
	0	ш.	ш.п.	·	0)	Limestone		
-				-		- 196.0-197.45' - pale yellowish brown	-	
-				-		to very pale orange, (10YR 6/2 to 10YR 8/2), very fine to fine grained,	-	
-				<del>-</del>		extremely weak to weak (R0 to R2), voids (<3/16") over 50% of rock	_	
-				-		surface, mottled, bioturbated over	-	
-				-		- 30% of rock surface, elastic silt (MH) from 196.0-196.5'	-	
-						197.45-199.4' - Same as	_	
_						- 196.0-197.45' except very weak to medium strong (R1 to R3), voids	-	
						(<3/16") over 70-80% of rock surface, cavities (<3/4"x1/2"), highly		
_						fossiliferous, trace laminated bedding	_	
_				_		199.4-200.2' - Same as 196.0-197.45' except voids (<1/16")	_	
-				-		over 30-50% of rock surface, poorly fossiliferous, organics from	-	
-						199.5-200.1'		
-				_		No Recovery 200.2-201.0'  Bottom of Boring at 201.0 ft bgs on	-	
-				-		- 3/12/2007	-	
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-04	SHEET	1	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724023.6 N, 457634.2 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6 tri-cone bit

DRILLIN	IG METH	OD AND	EQUIPMI	ENT : Dietrich D-	50 S/N 232, mud rotary, cathead, NWJ rods, 6 tri-cone bit ORIENTATION : Vertical
WATER	LEVELS	: 0.1 ft b	gs on 03/2	26/07	START : 3/25/2007 END : 3/27/2007 LOGGER : R. Bitely, C. Wallestad
,				STANDARD	SOIL DESCRIPTION g COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE INTERVAL (ft)			PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
밀망흔	RECOVERY (ft)				SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
H A A			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
				(N)	
41.3	1.5	1.0	SS-1	1-1-2 (3)	Poorly Graded Sand (SP) 0.0-1.0' - pale yellowish brown, (10YR 6/2), moist, very loose, very fine to fine grained, subrounded silica sand, trace nonplastic fines, 1" loamy organic layer at surface, brownish black (5YR 2/1), with 20% root
- -					\mass/organics
_					ground surface, based on split spoon sample
5 36.3	5.0				Rapid drilling rate
36.3	6.5	1.3	SS-2	1-2-3 (5)	Silty Sand (SM) 5.0-5.7' - dusky yellow, (5Y 6/4), wet, loose, very fine grained, subrounded silica sand, 20-25% low plasticity fines Clay With Sand (CH)
- - - -					5.7-6.3' - moderate olive brown, (5Y 4/4), moist, firm, high plasticity, no dilatancy, 20-25% very fine grained silica sand
10 <u> </u>	10.0				Fat Clay (CH)
- -	11.5	1.3	SS-3	16-4-8 (12)	10.0-10.2' - light olive gray, (5Y 5/2), wet, soft, medium to high plasticity, slow to no dilatancy, no HCI reaction, trace very fine grained silica sand  Silt (ML)
- - - -					10.2-10.7' - grayish yellow, (5Y 8/4), moist to wet, stiff, rapid to no dilatancy, moderate HCl reaction, fine to medium sand-sized lenses <1/2" thick at 10.2' contact, all carbonate  Silt (ML)  10.7-11.3' - Same as 10.2-10.7' except wet (saturated)  Moderate to slow drilling rate 11-20'
45	150				1 1
15 26.3 - -	15.0	1.0	SS-4	11-6-10 (16)	Sandy Silt (ML) 15.0-16.0' - grayish yellow, (5Y 8/4), moist, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction, scattered lenses <1/4" thick of fine to coarse sand
-	-				
-	-				
20					-



ſ	PROJECT NUMBER:	BORING NUMBER:					
ı	338884.FL	A-04	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724023.6 N, 457634.2 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6 tri-cone bit

					START: 3/25/2007 END: 3/27/2007 LOGGER: R. Bitely, C. Wallestad
WAILE	LLVLLO	: 0.1 ft bo	JO 011 00/2		SOIL DESCRIPTION COMMENTS
ĕ₽£	SAMPI F	INTERVA	L (ft)	STANDARD PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (ft)	07 11111 22	RECOVE		TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE,
TH I		INLOOVE	#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR ONSISTENCY, SOIL STRUCTURE, MINERALOGY NINERALOGY NINERALOGY
SUF			#ITPE	(N)	β ω ω ω ω ω ω ω ω ω ω ω ω ω ω ω ω ω ω ω
21.3	20.0				Silt And Limestone Lenses (ML)
		1.0	SS-5	18-11-11 (22)	20.0-21.0' - grayish yellow to grayish orange, (5Y 8/4 -
	21.5			(22)	dilatancy, moderate to strong HCl reaction, all carbonate, 50% silt and 50% limestone lenses <2"
					thick, voids and fossil structures intact
25	25.0				
16.3				0.40.40	Silt And Limestone Lenses (ML) 25.0-26.5' - Same as 20.0-21.0' except yellowish gray, - Ul to slow drilling rate
_		1.5	SS-6	8-10-16 (26)	(5Y 7/2), 2" elastic silt or lean clay (CL) seam at
l _	26.5			` ′	25.5'-25.65'; moderate plasticity with slow dilatancy
_					
_					
_					
_					
_					-
_					_
30 <u> </u>	30.0 30.3	0.0	00.7	F0/0	Live And Cit And Cit And Cond
11.5	00.0	0.2	SS-7	50/3 (50/3") /	Limestone Fragments And Silt And Sand 30.0-30.25' - Same as 25.0-26.5' except moderate
-					HCI reaction, all carbonate, limestone fragments <1/2" / _ thick
_					-
_					-
_					-
-					-
-					-
-					
35 6.3	35.0			20 E0/F	Silt With Sand (ML)
-	35.9	0.9	SS-8	20-50/5 (70/11")	35.0-35.9' - moderate yellowish brown to dusky -
-	55.5				yellowish brown, (10YŔ 5/4 to 10YR 2/2), wet, hard, low to medium plasticity, slow to rapid dilatancy, mild
-					\HCl reaction, 15% fine to coarse sand-sized / -
-					\(\scarbonate particles\) \(\scarbonate part
-					extremely slow drilling (15 minutes / 2 feet)
-					
-					
-					Heavy chatter from 39-40', slow drilling rate
40					
40_					



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	A-04	SHEET	3	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724023.6 N, 457634.2 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6 tri-cone bit

						END : 0/07/0007		. D	ONIENTATION . VEHICAL
WATER	LEVELS	. U. I II D(	gs on 03/2		START : 3/25/2007	END: 3/27/2007 SOIL DESCRIPTION	LOGGER	: K.	Bitely, C. Wallestad  COMMENTS
<b>≥</b> 5€	SAMDIE	INTERVA	J (ft)	STANDARD PENETRATION		COL DECOLUT HON		.0G	COMMETTO
E AN ON (	SAIVII EL		, ,	TEST RESULTS	SOIL NAM	IE, USCS GROUP SYMBOL	, COLOR,	IO.	DEPTH OF CASING, DRILLING RATE,
DEPTH BELOW SURFACE AND ELEVATION (ft)		RECOVE			MOISTURE	E CONTENT, RELATIVE DE	NSITY OR	SYMBOLIC LOG	DRILLING FLUID LOSS, TESTS, AND
SUR!			#TYPE	6"-6"-6" (N)	CONSISTEN	ICY, SOIL STRUCTURE, MII	NERALOGY	SYM	INSTRUMENTATION
1.3	40.0	0.1	SS-9	50/2	Limestone Fra	agments			Moderate to heavy chatter from 40-55',
-				(50/2")	40.0-40.1' - pal	le yellowish brown, (10YR moderate HCl reaction, ve	6/2), very		moderate to rapid drilling rate -
-					grained, <10%	voids <1/16" diameter			-
-									-
-							-		-
-							-		-
-							_		-
-							-		-
_							-		_
-							_		_
45 <u> </u>	45.0				Cilt. C1 /C*	A)		1000	_
-3.7				27-42-50/4.5	Silty Sand (SM 45.0-46.4' - mo	<b>//)</b> oderate yellowish brown, (՟	10YR 5/4)		_
_		1.4	SS-10	(92/10.5")	moist to wet, ve	ery dense, very fine to coa	rse grained,		_
_	46.4				mild to modera	ate HCI reaction, 30% nor	iplastic tines	1111	_
_							_		_
_							_		_
_							_		_
							_		
							_		
50	50.0 50.2						_		
-8.7	50.2	0.2	SS-11	50/2 (50/2")	Limestone Fra	agments oderate yellowish brown, (	10VD E/4)	Н	
				(50/2)	mild HCl reacti	ion, wafer-shaped fragme	nts <1/2" thick/		
						· · · · ·			
							_		_
-							=		_
-							_		_
-							-		-
-							-		-
-							-		-
55	55.0 55.3	0.1	CC 10	50/0	Limostana Fra	namonto			
-13.7	ეე.კ	0.1	SS-12	50/3 \ (50/3") /	Limestone Fra \55.0-55.1' - Sa	agments ame as 50.0-50.2'	7		End SPT at 55' below ground surface; switch to rock coring
-					Begin Rock Co	oring at 55.0 ft bgs			Set HW casing to 55' below ground surface
-					See the next sh	heet for the rock core log	_		at 17:00 Break for day at 17:00
-							_		Water level at 0' (ground surface)
-							-		
-							-		-
-							-		-
-							-		-
-							-		-
-							-		-
60									



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-04 SHEET 4 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724023.6 N, 457634.2 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 0.1	ft bg:	s on 0	3/26/07 START : 3/25/2007 END : 3/2	27/20	07 LOGGER : R. Bitely, C. Wallesta	i
<b>≷</b> ∩≎	(%)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU STH, OVEF	(%) <sub>Q</sub>	T.05	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
E P I	SECO	ğ	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	×™	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	55.0	ш.	ш.п.		0)	Limestone	Continue drilling at A-04 at
-	R1-NQ 1.5 ft	60	0	-	F	<ul><li>55.0-55.9' - moderate yellowish</li></ul>	07:30 on 03/26/07 -
-	60%	00	NR	55.7' - Mechanical break	Ħ	brown, (10YR 5/4), very fine to fine grained, moderate HCl reaction,	Begin rock coring at 55' Water level at 1 inch below
-	56.5		IVIX	-	⊬	<ul> <li>extremely weak to weak (R0 to R2),</li> </ul>	ground surface at 07:30 -
-			4	56.9, 57.0, 57.4, 57.95, 58.05, 58.9, 59.55,	H	strength decreasing with depth, voids <3/16" over 60% of surface, trace	R1: 2 minutes
-				60.0' - Fractures (8), <10 deg, rough, undulating, along bedding planes, open <1/2"		<ul> <li>organic laminations</li> </ul>	-
-			3	57.4' - Fracture, 60 deg, rough, undulating,	ш	No Recovery 55.9-56.5' Limestone	-
-	R2-NQ			open <1/2" _ 58.5' - Fracture, 40 deg, rough, undulating,	$\vdash$	- 56.5-60.1' - moderate yellowish	-
-	5 ft	48	>10	open <1/2"	F	brown, (10YR 5/4), very fine to fine grained, extremely weak (R0), to	-
	72%			59.15-59.55' - Fracture zone, rough, undulating, gravel-sized fragments <2"	F	<ul> <li>compacted non-indurated carbonate</li> </ul>	-
60 <u> </u>			2	diameter —	世	silts, <10% organics, voids <3/16" over 30% of surface, weakest	
-				-	H	<ul> <li>material at 56.5-57.2' and 58.5-60.0'</li> </ul>	R2: 8 minutes
-			NR	-	ш	No Recovery 60.1-61.5'	-
-	61.5			-	匚	Limestone	-
-			0	-	士	- 61.5-66.25' - moderate yellowish	-
-				-	+	brown, (10YR 5/4), very fine to fine grained, mild to moderate HCl	-
-			1	CO 11. Fracture or machanical break 25 dec	F	<ul> <li>reaction, extremely weak to weak</li> </ul>	-
-	R3-NQ			63.1' - Fracture or mechanical break, 35 deg, rough, undulating, tight	L	R0 to R2), <10% laminated organics, voids <3/16" over 40-50%	-
-	5 ft	82	0	63.3, 61.75, 64.1 - Mechanical break (3)	H	<ul> <li>of surface, strongest rock zones</li> </ul>	-
	95%			- 64.55, 64.65' - Fractures or mechanical break	₩	62.0-63.0' and 63.7-65.8', few cavities <1"x1/2"	-
65 -23.7			3	(2), <10 deg, rough, undulating, open <1/2"	匚	_	
				65.2' - Fracture or mechanical break, 35 deg, rough, undulating, open <1/2"	口	-	R3: 18 minutes
-			2	65.85, 66.05' - Fractures or mechanical break	ь	-	-
-	66.5		NR	(2), <10 deg, rough, undulating, along bedding planes, open <1/2"	Н	No Recovery 66.25-66.5'     Limestone	-
-	-		1	66.9, 67.9' - Fractures or mechanical break	F	66.5-71.25' - pale yellowish brown to	-
-				(2), <10 deg, rough, undulating, open <1/2"	Ħ	<ul> <li>moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine</li> </ul>	-
1 -			1	-	世	grained, moderate HCl reaction,	-
1 -	R4-NQ			-	ᡛ	_ extremely weak to medium strong (R0 to R3), voids < 3/16" over	-
-	5 ft	78	4	68.75, 69.1' - Fractures (2), 70 to 90 deg,	$\Box$	30-50% of surface, few fossil casts	-
	95%			69.3' - Fracture or mechanical break, <10	仜	and molds <1/4" diameter, trace secondary infill of cavities 1/4"	
70 <u> </u>			0	deg, rough, undulating, tight — 69.4, 70.05, 71.0' - Mechanical break (3)	世	— diameter	-
-					$\vdash$	-	R4: 8 minutes
-			0	-	F	-	=
-	71.5		NR	-	Ħ	No Recovery 71.25-71.5'     Limestone	-
-			0	-	Ħ	71.5-74.6' - pale yellowish brown to	Driller's Remark: Slight
-				-	世	<ul> <li>moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine</li> </ul>	water loss <10% - Driller's Remark: Strength
-			3	- 73.05, 73.15' - Fractures (2), horizontal,	H	grained, moderate HCl reaction, very	decreasing abruptly from
-	R5-NQ			rough, undulating, open <1/2"	匚	weak to medium strong (R1 to R3), voids <3/16" over <30% of surface,	74.8' to 75.4'
-	5 ft 62%	53	4	73.1' - Fracture, vertical, rough, undulating, intersects with 73.05' and 73.15', open 1/2"	口	moderately fossiliferous, fossil molds	-
75	. 02/0			74.25, 74.35' - Fractures (2), horizontal and	世	_ and casts <1-1/2" x 1/2", few cavities <1"x1/2"	
/5				50 deg, rough, undulating, open <1/4"			-



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724023.6 N, 457634.2 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 0.1	ft bg	s on 03	3/26/07 START : 3/25/2007 END : 3/	27/20	D7 LOGGER : R. Bitely, C. Wallesta	d
≥∩≘	_ (%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-33.7 -	2.25	ď	₩₩ NR	THICKNESS, SURFACE STAINING, AND TIGHTNESS  74.5' - Fracture, horizontal, rough, undulating, along bedding plane, open <1/4"	(S H	CHARACTERISTICS  No Recovery 74.6-76.5'	
-	70.5				Ħ	-	R5: 10 minutes
-	76.5		2	76.7, 76.75' - Fractures (2), 40 deg and horizontal, smooth, planar, tight		Limestone  76.5-77.3' - very pale orange to dark yellowish orange, (10YR 8/2 to 10YR	SC-1 collected at 76.75-77.6'
-	DC NO		3	77.65, 78.1, 78.2' - Fractures or mechanical break (3), <10 deg, smooth, undulating, along bedding planes, open <1/4" to tight		6/6), very fine to fine grained, strong  HCl reaction, extremely weak to medium strong (R0 to R3), strength increasing abruptly 77.3' to 77.4',	
-	R6-NQ 5 ft 91%	76	2	78.7, 78.85' - Fractures (2), 80 deg and 50 deg, rough, undulating, open 1/4" to 1/2"		non-indurated silt to extremely weak rock (R0) 76.5-77.3', trace voids      3/16", no fossils, trace laminated	-
-38.7 -			0	_	臣	— bedding 77.3-80.1' - Same as 76.0-77.3'	<del>-</del>
-	04 5		1 NR	80.5' - Fracture or mechanical break, <10 deg, rough, undulating, tight		<ul> <li>except medium strong (R3), voids</li> <li>&lt;3/16" over 30-50% of surface, trace fossil casts, trace secondary infill</li> </ul>	R6: 18 minutes
-	81.5		2	82.15, 82.45' - Mechanical break or fractures		80.1-81.05' - Same as 77.3-80.1' - except secondary infill with voids <3/16" over 30-50% of surface,	-
-			>10	(2), <10 deg, rough, undulating, open <1/2"		poorly fossiliferous, heavily bioturbated with 50% of bioturbation with secondary infilling, cavities up to	- -
-	R7-NQ 5 ft 100%	86	0	83.5-83.9' - Fracture zone, rough, undulating, gravel-sized fragments <1-1/2" diameter		1/2"x5" No Recovery 81.05-81.5' Limestone	-
85_ -43.7_			0		F	81.5-82.0' - moderate yellowish brown to yellowish gray, (10YR 5/4 to 5Y 8/1), very fine to fine grained, strong HCl reaction, extremely weak	
-	86.5		0			to medium strong (R0 to R3), voids <3/16" over 30-60% of surface, heavily fossiliferous, fossil	R7: 9 minutes -
-			1	87.35' - Fracture or mechanical break, 60-90		molds/casts <1"x1/4", cavities <1/2"x1/4", few cavities with secondary infill	- -
-	R8-NQ		4	deg, rough, undulating, tight to open 1/8" 87.65' - Fracture or mechanical break, 20 deg, rough, undulating, tight to open 1/8"	H	82.0-82.25' - Same as 81.5-82.0' except very weak (R1), laminated/variegated bedding 30% of	-
90	5 ft 98%	84	0	88.25, 88.4, 88.45' - Mechanical break or fractures (3), rough, undulating, open <1/2" at 88.25', others are tight 88.9, 88.95, 89.35' - Mechanical break (3)	Ħ	zone 82.25-84.8' - Same as 81.5-82.0' - 84.8-85.25' - Same as 81.5-82.0' except non-indurated silts as	-
-48.7 -			0			secondary infill, very very weak  ( <r0) -="" 81.5-82.0'<="" 85.25-85.4'="" as="" same="" td=""><td>R8: 11 minutes</td></r0)>	R8: 11 minutes
-	91.5		0 (NR)		E	85.4-86.0' - Same as 81.5-82.0' - except extremely weak (R0), trace	SC-2 collected at 95.65-
-			2	91.65' - Fracture, horizontal, smooth, planar, along bedding plane, tight 92.2' - Fracture, 70 deg, rough, undulating,	Ħ	voids 86.0-86.5' - Same as 81.5-82.0' -	96.45' -
-			10	tight 92.85-92.9' - Fracture zone, rough, planar	77	<u> </u>	-
-	R9-NQ 5 ft 99%	50	10	93.6, 93.7, 93.8, 93.9, 94.05' - Fractures, 80 deg, rough, undulating, tight	Ħ		-
95					H		



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724023.6 N, 457634.2 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				IENT . Dietrich D-50 5/N 252, mud rotary, NQ tools, HW		-	ORIENTATION: Vertical
WATER	LEVELS: 0.1	ft bgs	s on 0		27/20		
≥∩₽	, (9			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	FOG	ROCK TYPE, COLOR,	
ᆱ႘ᅙ	Z, X ₽, X A, X	(%	FRACTURES PER FOOT		SYMBOLIC	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
ΞĂŽ	GTE F	(%) O	CT.	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BO	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
925	REN S	ď	RA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ϋ́	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	0716	IL.			0)		
-53.7			10	94.45' - Fracture, <10 deg, rough, undulating,		Limestone	
				tight 94.8-95.2' - Fractures, 80 deg, rough,		86.5-91.4' - moderate yellowish brown to yellowish gray, (10YR 5/4 to	R9: 14 minutes
-			1	undulating, tight	$\perp$	5Y 8/1), very fine to fine grained,	-
I -	96.5		NR/	95.45' - Fracture, 65 deg, rough, undulating,	╀╌	- strong HCl reaction, extremely weak	_
			2	tight		to weak (R0 to R2), voids <3/16"	
1 -				95.65' - Bedding plane, horizontal, smooth,		over 30%, moderately to highly	
-				undulating, along bedding plane, tight	₩	- fossiliferous, fossil casts and molds	_
-			1	96.65' - Fracture or mechanical break, 20 deg, rough, undulating, tight to open 1/8"	$\pm \Box$	less than 1"x1/2"; cavity zones from 87.1-88.45' and 90.0-91.4'; trace	_
<u> </u>				97.15' - Fracture, 80-90 deg, rough,		unfilled cavities 1-1/2"x1"; heavily	_
	R10-NQ			undulating, tight	$\vdash$	bioturbated or dissolution cavities	
-	5 ft	50	2	97.9' - Fracture, 70 deg, rough, undulating,	T	over 25% of core, 20% filled with	_
-	100%			tight	匚	<ul> <li>secondary infill of poorly indurated</li> </ul>	-
100_			1	99.0, 99.2' - Mechanical break or bedding	$oldsymbol{oldsymbol{eta}}$	silts to extremely weak rock (R0)	
-58.7				plane (2), <10 deg, rough, undulating, tight to	$\vdash$	No Recovery 91.4-91.5'	
I -				open 1/8" 99.4' - Fracture, 85 deg, rough, undulating,		Limestone 91.5-93.05' - yellowish gray, (5Y 8/1),	R10: 6 minutes
-			2	tight	ш	very fine to fine grained, strong HCl	-
I -	101.5			100.4, 100.6' - Fracture (2), 50 deg and 80	$\vdash$	reaction, extremely weak to medium	
				deg, smooth, undulating to stepped, tight		strong (R0 to R3), weak zones at	
_			10	100.85' - Mechanical break or bedding plane,	ш	92.35-93.05', voids <3/16" over	_
_				<10 deg, smooth, undulating, tight	+	_ 0-15% surface, poorly fossiliferous,	_
I _			0	101.55, 101.6, 101.85, 101.95, 102.0' -		trace organics	_
				Fractures or bedding plane (5), 70-90 deg and horizontal, rough, undulating, tight to		Fat Clay To Elastic Silt (CH)	
-	R11-NQ			open <1/4"	╁	93.05-93.25' - olive gray, (5Ý 3/2), strong HCl reaction, high plasticity	-
-	5 ft	86	0	102.45' - Fracture, 60 deg, rough, undulating,	+	from 93.05-93.15', moderate to low	_
_	98%			tight	ш	plasticity from 93.15-93.25',	_
105				103.7, 104.0' - Mechanical break (2)	$\vdash$	non-indurated silt	
-63.7			0	<del>-</del>	1	Limestone	
-						- 93.25-96.45' - Same as 91.5-93.05'	R11: 5 minutes
_			0		<b>-</b>	except weak zones at 93.25-93.4'	-
	106.5					and 95.5-96.45'; at 94.3-95.5' voids - <3/16" over 60% of surface and	
I -			NR.		Ш	highly fossiliferous with fossil casts	1
-			1		╀	and molds up to 1/4" diameter	-
-				107.2' - Fracture, 70 deg, rough, undulating,	+	<ul><li>No Recovery 96.45-96.5'</li></ul>	-
I			10	tight	Ш	Limestone	
I -			10	·	$\vdash$	96.5-101.5' - very pale orange to	1
-	R12-NQ			108.3' - Fractures (3), 70-90 deg, rough,	1	grayish orange, (10YR 8/2 to 10YR	
-	5 ft	86	2	undulating, intersecting fractures, tight to open <1/4"	$\Box$	7/4), very fine to fine grained, strong HCl reaction, extremely weak (R0),	-
I _	100%			109.1, 109.25' - Fractures (2), 70 deg and	$\vdash$	medium strong (R3) zone from	
110				horizontal, rough, undulating, intersecting	$\vdash$	99.3-100.2'; voids <3/16" cover	]
-68.7			0	fractures, tight to open <1/4"	仜	10-25% of surface, except voids	_
-					1	<3/16" cover 40-60% of surface at	R12: 7 minutes
I -			0		_	99.3-100.2'; moderately fossiliferous with fossil casts and molds to	13.7 Illillutes
I	111.5					_ 1"x3/4", trace secondary infill in	
I -	-				1—	casts, trace organics, trace laminae.	1
-			0		╀	101.5-106.4' - Same as 96.5-101.5'	-
I -					$\Box$	except extremely weak to weak (R0	
I					$\vdash$	to R2), voids <3/16" cover 10-25%	
I -			0		1-	No Recovery 106.4-106.5'	1
-	R13-NQ			113.45, 114.05, 116.3' - Mechanical break (3)	仜	-	-
-	5 ft	100	0			<u>-</u>	-
I	100%				$\vdash$		
115							1
113					1		<u> </u>
I					1		
L							



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724023.6 N, 457634.2 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 0.1	ft bgs	s on 0	3/26/07 START : 3/25/2007 END : 3/	27/20	D7 LOGGER: R. Bitely, C. Wallestad	d
≥0.≎	(%)			DISCONTINUITIES	Ö	LITHOLOGY	COMMENTS
N (#	Ä, AND ≪ (%		RES T	DESCRIPTION	J C I C	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-73.7	034	ď	0	THICKNESS, SURFACE STAINING, AND HIGHTNESS	Ś		CC 2 collected at 11F 1F
-/3./			0	115.45' - Mechanical break	H	Limestone - 106.5-111.5' - yellowish gray, (5Y	SC-3 collected at 115.45- 116.3' -
_			0	113.43 - Mechanical break	世	7/2), very fine to fine grained, very weak to weak (R1 to R2), voids	R13: 12 minutes
_	116.5				╨	- <3/16" over 20-50% of surface,	-
_			0		ፗ	moderately fossiliferous, fossil casts and molds <1/2" diameter, trace iron	-
_					上	- staining	-
_			0		╁╌	Limestone 111.5-116.5' - yellowish gray, (5Y	_
_					F	<ul> <li>8/1), very fine to fine grained, strong</li> </ul>	_
_	R14-NQ 5 ft	96	0		<u></u>	HCl reaction, weak (R2), voids <3/16" over <20% of surface, trace	=
_	100%			119.05' - Mechanical break	$\vdash$	- laminations, poorly fossiliferous, few	_
120			0	_	╨	fossil molds 1/2"x1/4" 116.5-120.7' - yellowish gray, (5Y	
-78. <del>7</del> -					Д	<ul> <li>8/1), very fine to fine grained, strong</li> </ul>	
_			2	120.7, 120.9' - Mechanical break or bedding	上	HCl reaction, very weak to weak (R1 to R2), trace laminations, voids	R14: 17 minutes
_	121.5			plane (2), horizontal, smooth, undulating, tight to open 1/2"	廾	<ul><li>&lt;3/16" over 10-50% of surface</li></ul>	_
_			1	•	F	(highly variable across length), moderately to heavily fossiliferous	_
_			·	121.95, 122.0' - Fractures (2), 50 deg and 30 deg, rough, undulating, intersecting fractures,		with fossil casts and molds up to 1/4"	
_			0	open 1"		diameter, especially 117.5-118.0' and 118.5-119.5', laminated bedding from	_
_					╨	_ 116.85-117.0'	_
_	R15-NQ 5 ft	94	3	102.05 124.0 124.25! Radding plans (2)	Щ	120.7-121.5' - Same as 116.5-120.7' except extremely weak (R0) rock to	_
_	100%			123.95, 124.0, 124.25' - Bedding plane (3), horizontal, smooth, planar to stepped, tight	ፗ	non-indurated silt, laminated from	_
125_			0	_	上	120.7-120.9' 121.5-123.6' - yellowish gray to	_
-83.7					╁╴	grayish orange, (5Y 8/1 to 10YR 7/4),	
_			0		F	very fine to fine grained, strong HCl reaction, weak (R2), voids to 3/16"	R15: 12 minutes
_	126.5					over 50% of surface, decreasing with	
_			1		╚	depth, fossil casts and molds to - 1/2"x1/4" over 30% of surface.	_
_			·	127.2, 130.45, 131.0, 131.05, 131.35' -	尸	_ 123.6-126.55' - Same as	
_			0	Fractures (5), <10 deg, smooth, planar to undulating, along bedding planes, tight to	厂	121.5-123.6' except voids to 3/16"  over 20-40% of surface, trace fossil	
_				open 1/4"	上	molds and casts to 1/4" diameter,	
_	R16-NQ 5 ft	89	0			possibly bioturbated 123.6-126.55' - 126.55-131.45' - very pale orange to	]
_	99%				$\vdash$	pale yellowish brown, (10YR 8/2 to	]
130			0	_	井	10YR 6/2), very fine to fine grained, — strong HCl reaction, very weak to	
-88.7				130.1' - Mechanical break	片	weak (R1 to R2), voids to 3/16" over	]
_			4		Ł	10-20% of surface except 130.15-130.85' voids to 3/16" over	R16: 11 minutes
_	131.5				$oxed{\square}$	60% of surface, poorly to moderately	
-			(NR) 1	131.55, 133.9' - Fractures (2), horizontal, smooth, planar, along bedding planes, tight	上	fossiliferous except 130.15-130.85' highly fossiliferous, with casts and	SC-4 collected at 133.9- 134.7' -
_				omootii, pianai, along bedding planes, tight	上	molds to 1/2"x1/4", trace infill material	
_			0		$\vdash$	material No Recovery 131.45-131.5'	]
_					厈	<u>-</u>	
_	R17-NQ 5 ft	98	1		片	_	
_	99%	50			片	_	]
135					$\vdash$		
					1		I



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-04	SHEET	8	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724023.6 N, 457634.2 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 0.1	ft bg	s on 0	3/26/07 START : 3/25/2007 END : 3/	27/200	D7 LOGGER : R. Bitely, C. Wallestad	1
≥∩≘	(%)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q D	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-93.7 -	136.5	<u>«</u>	0	134.7, 135.1' - Bedding plane or mechanical break (2), 10-20 deg, smooth, undulating, trace organics, tight		Limestone  131.5-136.45' - pale yellowish brown to yellowish gray, (10YR 6/2 to 5Y 8/1), very fine to fine grained, strong  HCl reaction, extremely weak to	R17: 8 minutes
	R18-NQ 5 ft 98%	86	0 0 1	136.65, 140.2, 140.65' - Fractures or mechanical break (3), rough, undulating, along bedding planes, open <1/2"		weak (R0 to R2), voids to 1/16" covering 10-30% of surface, decreasing with depth, except voids to 3/16" over 60-70% of surface from 131.6-133.05', trace fossils, except highly fossiliferous 131.6-133.05', with casts and molds to 3/4"x1/2", trace infill in fossil casts No Recovery 136.45-136.5' Limestone 136.5-141.4' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, weak to medium strong	R18: 10 minutes  DR: 100% circulation loss at 141.5' below ground surface
-	141.5		>10 (NR) 1	undulating, fragments <1-1/2" diameter  142.45, 142.55' - Fracture zone, rough, undulating, fragments <1/2" diameter.		(R2 to R3), voids to 3/16" over 5-30% of surface, decreasing with depth, poorly to moderately fossiliferous, fossil casts and molds to 3/4"x1/4", secondary infill extremely weak rock (R0) and void	Stop drilling at 17:30 on 03/26/07 at 141.5' below ground surface Water level at 1.8' below ground surface at 17:30
- - 145 -103.7	R19-NQ 5 ft 97%	75	2	angular, open <1" 142.9, 143.1, 143.25, 143.35, 143.55' - Fractures (5), <10 deg, rough, undulating, tight to open <1" at 143.25-143.35', with angular rock fragments <1" diameter 143.8' - Fracture, horizontal, smooth, undulating, along bedding plane, tight		<3/16" over 30-40% in infill, several bioturbation or dissolution cavities with secondary infilling up to 2" x 1" No Recovery 141.4-141.5' Limestone 141.5-143.6' - light olive gray to moderate yellowish brown, (5Y 5/2 to 10YR 5/4), very fine to fine grained,	Continue rock coring 03/27/07 at 08:00 - Water level at 1.3' below ground surface No circulation -
-	146.5		1 (NR) 1	144.0, 144.5' - Mechanical break (2) 144.9' - Fracture, <10 deg, smooth, undulating, tight 145.95' - Fracture, <10 deg, smooth, undulating, along bedding plane, tight to open <1/4"		weak to medium strong (R2 to R3), voids <3/16" over 20-30% of surface moderately fossiliferous, fossil molds <1/2" diameter, many cavities <1-1/2"x1/2" comprising 20% of surface, several (<50% of cavities)	R19: 12 minutes
-	R20-NQ 5 ft	98	0	146.6' - Fracture, horizontal, rough, undulating, along bedding plane, open <1/4"		with secondary infill, trace organic laminations 143.6-146.35' - Same as 141.5-143.6' except moderate HCl reaction, voids <3/16" over <5%-30% variable, trace laminated bedding	- - -
150_ -108.7 -	100%		1 0	149.55' - Fracture, horizontal, smooth, undulating, along bedding plane, open <1/4" —		especially 143.8-144.0' and — 145.9-146.0', poorly fossiliferous No Recovery 146.35-146.5' — Limestone — 146.5-149.6' - grayish orange to	R20: 8 minutes
-	151.5		1	152.1, 153.0, 153.15, 153.25, 153.35, 153.7' - Fractures or mechanical break (6), along		moderate yellowish brown, (10YR 7/4 to 10YR 5/4), very fine to fine grained, weak to medium strong (R2 to R3), strength increasing with depth, except very weak rock (R1) at	SC-5 collected at 152.1- 152.9'
-	R21-NQ 5 ft 100%	90	1	bedding planes, smooth to rough, undulating, tight 152.9' - Mechanical break 153.9, 154.15, 154.4' - Mechanical break (3) 154.0' - Mechanical break		149.35-149.6', voids <3/16" over <20% of surface, poorly fossiliferous, trace cavities with secondary infill <1"x1/2"	- - -
155					$\vdash$		



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-04

SHEET 9 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724023.6 N, 457634.2 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 0.1	ft bg	s on 03	3/26/07 START: 3/25/2007 END:	3/27/20	07 LOGGER: R. Bitely, C. Wallesta	d
≥ ∩ ⊕	(9)			DISCONTINUITIES	ي	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-113.7 - 160118.7	NOO3BU 156.5  R22-NO 5 ft 98%	Q R	Image: color of the performance of th	PLANARITY, INFILLING MATERIAL AND	SS	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-05	SHEET	1	OF	q	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723975.3 N, 457680.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 2-3/8 tri-cone bit

WATER	LEVELS	: 3.5 ft b	gs on 3/06	6/07 5	START : 2/26/2007 END : 3/1/2007 LOGGER : T. Valentine, R. Bitely	, J. Schaeffer
				STANDARD	SOIL DESCRIPTION	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CONSISTENCY, SOIL STRUCTURE, MINERALOGY	PACING DRILLING DATE
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DEPTH OF C	CASING, DRILLING RATE, LUID LOSS, TESTS, AND
EPT CLEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	TRUMENTATION
42.0				(14)	Water level is b	ased on Ground Water
-					- Monitoring at LN 2.4.12.08)	NP site (FSAR Table -
-					2-3/8" tricone ro	ller bit
_					1	-
-					1	_
					]	_
	3.5					_
-				5-5-4	Poorly Graded Sand With Silt (SP-SM) 3.5-4.2' - moderate yellow to moderate olive brown,	_
_		0.7	SS-1	(9)	(5Y 7/6 to 5Y 4/4), wet, loose, 10-15% nonplastic	-
5 37.0	5.0				fines, 30% very fine silica sand, trace iron cemented sand concretions to 1/8"	
37.0						-
-					- 1	-
-						-
_						<del>-</del>
-					1 1	-
-	8.5				1	<del>-</del>
-	0.0			0.40.50/4	Silt (ML)	_
		1.2	SS-2	9-18-50/4 (68/10")	8.5-9.7' - dark yellowish orange, (10YR 6/6), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl	<del>-</del>
10	9.8				reaction, 9% fine to medium sand-sized, all carbonate	
32.0					<u> </u>	_
-					1 1	<u>-</u>
_						-
-					-	<del>-</del>
-						-
-	13.5					_
-	13.5				Silt With Sand (ML)	-
-		1.3	SS-3	25-28-31	13.5-14.8' - Same as 8.5-9.7' except 20% very fine to medium sand	-
15	15.0			(59)	1111	-
27.0					]	
_					]	
-					] ]	_
-					] ]	_
-	17.5 18.1	0.3	SS-4	33-50/1	Silt With Sand (ML)	-
-	10.1	0.3	33-4	(83/7")	17.5-17.8' - Same as 13.5-14.8' except lens of fine to /-	-
-					\coarse sand-sized material from 18.6-18.7'	-
1 -					-	-
20						_
20_						



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-05	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723975.3 N, 457680.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 2-3/8 tri-cone bit

WATER	LEVELS	: 3.5 ft bo	gs on 3/06	6/07 S	START : 2/26/2007 END : 3/1/2007 LOGGE	R :	T. Valentine, R. Bitely, J. Schaeffer
				STANDARD	SOIL DESCRIPTION	Ī	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LICCS OPOLID SYMPOL COLOR	1	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	1	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EPT SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	1	INSTRUMENTATION
22.0				(14)		$\dagger$	
-						1	1
-						1	1
						]	
_						1	
_						4	-
_	23.5			25-50/2	Silty Sand (SM)	-	<del></del>
-	24.2	0.6	SS-5	(75/8")	23.5-24.1' - dark yellowish orange, (10YR 6/6), wet,	4	-
					very dense, mild to moderate HCl reaction, fine to coarse sand, 35% nonplastic fines, all carbonate	1	-
25 <u> </u>						┪	
-						1	1
_						1	1
						]	
_						1	_
_						4	-
_	28.5				Silty Sand (SM)	+,	<del></del>
-		0.9	SS-6	8-8-50/2 (58/8")	28.5-29.4' - Same as 23.5-24.1' except fragmented	-[	<del> </del>
30	29.7			(30/0 )	limestone lenses 1/4"-1/2" thick at 28.75' and 29.4'	#	-
12.0					-	1	1
_						1	1
						]	
_						1	_
_						4	-
-						+	-
-	33.5				Silty Sand With Gravel (SM)	╁	<del></del>
-		1.2	SS-7	13-16-7	33.5-34.7' - dark yellowish orange, (10YR 6/6), wet, medium dense, mild to moderate HCl reaction, fine to	-[]	-
35	35.0			(23)	$\neg$ coarse sand, 25% fine to coarse gravel, 30%	#	Щ - †
7.0	23.0				nonplastic fines, all carbonate	1	
						]	]
_						1	]
-						-	Drillar's Romark: Intermittent house shotter
-						+	Driller's Remark: Intermittent heavy chatter on drilling 37.0-38.5'
-	00.5					+	Driller's Řemark: Very dense material, difficult drilling 37.0-40.0'
-	38:8	0.0	SS-8	50/1.5	No Recovery 38.5-38.6'	#	<b>╡</b>
-				(50/1.5")		1	1
40						1	1
						1	



WATER LEVELS: 3.5 ft bgs on 3/06/07

SAMPLE INTERVAL (ft)

RECOVERY (ft)

#TYPE

SS-9

SS-10

SS-11

SS-12

DEPTH BELOW SURFACE AND ELEVATION (#)

2.0

45 -3.0

50

-8.0

55

-13.0

60

43.5 43.8

48.5

49.0

53.5

54.3

58.0

58.0

0.1

0.5

0.5

0.0

PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-05	SHEET	3	OF	9	

#### **SOIL BORING LOG**

LOG

SYMBOLIC

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723975.3 N, 457680.2 E (NAD83)

START: 2/26/2007

STANDARD

PENETRATION TEST RESULTS

6"-6"-6" (N)

50/3 (50/3")

50/4

(50/4")

47-50/3

(97/9")

50/0

(50/0")

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

> END: 3/1/2007 SOIL DESCRIPTION

SOIL NAME, USCS GROUP SYMBOL, COLOR,

MOISTURE CONTENT, RELATIVE DENSITY OR

CONSISTENCY, SOIL STRUCTURE, MINERALOGY

Lean Clay With Sand (CL) 43.5-43.6' - moderate olive brown, (5Y 4/4), wet, hard,

medium plasticity, mild to moderate HCl reaction,

20% sand and limestone fragments

Fat Clay (CH) 48.5-48.6' - pale olive, high plasticity

48.6-48.8' - moderate olive brown, (5Y 4/4), wet, low

53.5-53.95' - moderate olive brown, (5Y 4/4), wet, very

dense, mild to moderate HCl reaction, fine to coarse sand, 25% nonplastic fines, 30% fine gravel

plasticity, rapid dilatancy, mild to moderate HCI reaction, 25% fine to coarse sand, 20% gravel

Silt With Sand And Gravel (ML)

Silty Sand With Gravel (SM)

Begin Rock Coring at 58.0 ft bgs

See the next sheet for the rock core log

limestone, all carbonate

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 2-3/8 tri-cone bit

ORIENTATION: Vertical LOGGER: T. Valentine, R. Bitely, J. Schaeffer COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION Driller's Remark: Heavy chatter from rig



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-05	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723975.3 N, 457680.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

CORING	3 IVIE I NOD AI	אט בי	ZUIFIV	IENT: Dietrich D-50 S/N 232, mud rotary, NQ tools, HW	Casing		ORIENTATION : Vertical
WATER	LEVELS: 3.5	ft bg	s on 3	/06/07 START : 2/26/2007 END : 3/	1/2007	LOGGER: T. Valentine, R. Bitely	, J. Schaeffer
				DISCONTINUITIES		LITHOLOGY	COMMENTS
≩Q₽	_(°				- FOG	EITHOLOGI	COMMENTO
ΠĄΣ	ZAX		ES	DESCRIPTION	]	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
불병은	1 25.1点	%	N G	DEDTH TYPE ODIENTATION DOLLOUNESS	1ặ1	MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
₽₽₹	# <u>P</u>	(%) Q	CT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	JB(	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	g	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
В 67 Ш		ш.	ш.		9		
	58.0		ا ر ا	58.05' - Mechanical break, vertical, rough,	Н	Limestone	
_	R1-NQ		3	stepped	П	- 58.0-59.7' - light olive gray, (5Y 5/2),	Driller's Remark: hard,
-	2 ft	54		58.1' - Mechanical break, 10 deg, rough,		very fine to fine grained, strong HCl reaction, weak to medium strong (R2	switch to 3 7/8" rock core -
I .	80%		2	stepped	ш	to R3), voids up to 3/16" on 50% of	bit to depth _
60	60.0		NR	58.3' - Mechanical break, 60 deg, rough, undulating	Н	surface, cavities up to 1/2",	R1: 2 minutes
-18.0	00.0		LINIX.	59.05' - Bedding plane or mechanical break,	╁┼╁	microfossils with few macrofossils, 1"	Even, continuous boring —
-	R2-NQ		>10	rough, undulating	П	low to moderate plasticity silt at	
	1.5 ft	31		59.45' - Fracture, 70 deg, smooth, undulating		59.5-59.6'	R2: 2 minutes
-	60%		NR	60.0-60.4' - Fracture zone or mechanical	ш	No Recovery 59.7-60.0'	Short run to adjust tooling -
_	61.5			break, multiple intersecting fractures, various	Н	- Limestone	for 5' continuous run length
			4	angles, bedding plane fractures at 60.2',	Н	60.0-60.8' - Same as 58.0-59.7	
1 -			1	60.25', and 60.4, rough to smooth, undulating	Ш	except medium strong to very strong	SC-1 collected at 62.0-
1 -	-			to stepped, tight	┰	- (R3 to R5), trace organic	62.8'
1 .	]		1	61.7' - Mechanical break	Щ	laminations, seams up to 1/16" thick,	
1			'	62' - Bedding plane, horizontal, smooth,	Н	voids <3/16" over 60% of surface,	
-	R3-NQ			undulating	т	few cavities up to 1x1/4"	-
	5 ft	55	3	62.8' - Bedding plane, 40 deg, rough, stepped	ш	No Recovery 60.8-61.5 Limestone	_
	75%			63.1' - Mechanical break	Н	61.5-65.25' - Same as 60.0-61.5'	
	1			63.35' - Mechanical break, 40 deg, rough, stepped	₩	except moderate yellowish brown to	_
65_	4		6	63.7' - Mechanical break, 60 to 90 deg,	H	pale yellowish brown, (10YR 5/4 to	
-23.0				smooth, undulating		10YR 6/2), extremely weak (R0),	
1			ND.	63.8' - Mechanical break, 50 deg, smooth,	Ш	voids up to 1/12" on 30% of surface,	R3: 9 minutes
-	-		NR	undulating, intersecting 67.7' mechanical	╁┼	large cavities up to 3" with silt infill	-
_	66.5			break	Н	No Recovery 65.25-66.5'	
				64.05' - Mechanical break, horizontal, rough,	П	Limestone	
-	1		4	undulating		66.5-67.3' - Same as 61.5- 66.5'	-
				64.65-64.75' - Mechanical break (4), rough,	ш	except very weak to medium strong	_
				undulating, multiple intersections and angles,	Н	(R1 to R3), voids <1/16" over 10% of	
-	1		3	ground rock	111	surface, trace cavity infill	_
-	54.110			64.75' - Fracture, 60 deg, smooth, undulating	◫	67.3-68.1' - Same as 66.5-67.3'	SC-2 collected at 68.45-
	R4-NQ 5 ft	77	0	65.05' - Bedding plane, 40 deg, smooth,	Ш	except weak to medium strong (R2 to	69.45' –
	98%	11	0	undulating	Ш	R3), voids up to 3/16" over 50% of surface, cavities up to 1/2"	00.40
-	30 /0			67.05, 67.15, 67.30, 67.65' - Mechanical	Н	68.1-68.45' - Same as 67.3-68.1'	-
70			1	break (4), <10 deg, rough, stepped to undulating	П	except very weak (R1), friable	
-28.0			'	68.15, 68.45' - Bedding plane, horizontal,		surface, no voids or cavities	
1 -	1			smooth, undulating	┰┦	68.45-71.4' - Same as 68.1-68.45'	R4: 13 minutes
-	4		1	68.3' - Mechanical break	₽₽	except dense, strong HCl reaction,	-
	71.5		L.,_	69.7. 70.1' - Mechanical break	Н	medium strong (R3), voids up to	
1 -			NR.	70.4' - Fracture, 60 deg, smooth, undulating		1/16" over 20% of surface, trace	1
-	-		1	71.05' - Fracture or mechanical break, 10 to	ш	- organics, microfossils	-
1 .	]			50 deg, rough, stepped to undulating	H	No Recovery 71.4-71.5'	
1				71.2' - Fracture, vertical, rough, stepped to	Н	Limestone	]
-	1		2	undulating	$\sqcap$	- 71.5-72.4' - Same as 68.45-71.4'	-
1 -	4			72.15' - Bedding plane, horizontal, smooth,		except pale yellowish brown to	_
	R5-NQ			undulating	ш	yellowish gray, (10YR 6/2 to 5Y 7/2),	
-	5 ft	55	3	72.4' - Mechanical break or bedding plane,	╆	very weak to weak (R1 to R2), voids	<b> </b>
-	88%			horizontal, smooth, undulating, <1/2" open	╀┤	<3/16" over 60% of surface 72.4-72.65' - Same as 71.5-72.4'	_
75			,	72.65' - Bedding plane, horizontal, smooth,	Ш	except extremely weak to weak (R0	
-33.0	]		1	undulating — 72.8' - Fracture, 70 deg, rough, undulating		to R2), few cavities 1/4 x 1/8"	
-	-		$\vdash$	73.8' - Fracture, 70 deg, rough, undulating	Ш	72.65-75.1' - Same as 72.4-72.65'	D5: 11 minutos
			>10	73.8 - Fracture, nonzontal, rough, undulating 74.5, 74.75, 74.85' - Mechanical break		except medium strong (R3), voids up	R5: 11 minutes
1 -	76.5		NR	75.1' - Fracture, 20 deg, smooth, undulating		to 3/16" over 50%, cavities up to	]
1 -	76.5		+	75.1 - Fractine, 20 deg, shlootif, tindulating 75.15, 75.25' - Mechanical break, horizontal,		1/2x1/4" over 40%, sharp contact at	-
1 -	1		>10	rough, undulating, 1/2" open	<del>    1</del>	75.1'	_
			' '	75.55' - Fracture, 50 deg, rough, undulating	Н		
-	1			, -5,5, ,	ш	-	<u> </u>
					₩	_11	



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-05 SHEET 5 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723975.3 N, 457680.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				IENT : Dietrich D-30 3/N 232, Hidd Totaly, NQ tools, HW			ORIENTATION : Vertical
WATER	LEVELS : 3.5	ft bg	s on 3		1/2007		
ŞQ€	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	<b>1</b> g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	ŽAŽ ŽAŽ		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A A B B B B B B B B B B B B B B B B B B	S F, Ä	(%) □	758	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ğ	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FF.F.	NS S	OΩ	AC.	PLANARITY, INFILLING MATERIAL AND	MB.	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
무용되	8삠胐	æ	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	λS	CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
			4	75.6, 75.65' - Mechanical break or fracture	ш	Limestone	
-	R6-NQ			zone, multiple intersecting fractures and	++	- 75.1-75.6' - Same as 72.65-75.1'	-
-	5 ft	57	3	angles, ground rock 75.8' - Bedding plane, horizontal, smooth,	甘	except extremely weak to very weak (R0 to R1), weakens with depth,	-
-	94%			undulating	₽₽	voids up to 3/16" over 30%	-
80			2	76.85-77.4' - Fracture zone, rough,		Calcareous Silty Fat Clay (CH)	
-38.0			-	undulating, various angles	$\vdash$	75.6-75.9' - moist, hard, high	
-			0	77.4' - Fracture, 50 deg, rough, undulating 77.65, 77.95, 78.0, 78.05' - Bedding plane,	H	plasticity, strong HCl reaction No Recovery 75.9-76.5'	R6: 18 minutes
-			_	<10 deg, smooth, undulating	ш	Calcareous Silty Fat Clay (CH)	-
-	81.5		NR	78.55, 78.95, 79.35' - Bedding plane,	╁┼┼	76.5-76.85' - Same as 75.6-75.9'	-
_			1	horizontal, smooth, undulating	口	except pale yellowish brown, (10YR	_
<u> </u>				79.5' - Mechanical break 80.3, 80.5' - Bedding plane, <10 deg, rough,	Ж	6/2), moist	
1			[	undulating	Ш	Limestone 76.85-78.65' - pale yellowish brown,	SC-3 collected at 82.45- 83.25' –
1 -			0	80.55-80.7' - Mechanical break	1 -	(10YR 6/2), strong HCl reaction,	03.25
1 -	R7-NQ			81.9, 84.3' - Mechanical break 82.25' - Mechanical break, 40 deg, smooth,	⇈	extremely weak to weak (R0 to R2),	-
-	5 ft	83	5	undulating	₩	trace laminations with organics, voids	-
_	100%			83.6-83.65' - Fracture zone, rough, stepped,	H	up to 3/16" over 20%, cavities up to 1/4x1/8" over 5% of surface	-
85			2	various angles, ground rock	я	78.65-79.85' - Same as 76.85-78.65'	
-43.0			^	84.55, 85.2, 85.6, 85.95' - Mechanical break, rough, undulating to stepped, <1/2" open	Н	except weak to medium strong (R2 to	
_				rough, undulating to stepped, 172 open	Ш	R3), voids up to 3/16" over 30-50%	R7: 13 minutes
-			3		╁┼┼	of surface 79.85-80.50' - Same as 78.65-79.85'	1
-	86.5			86.45' - Bedding plane, horizontal, smooth,	口	except dark yellowish brown, (10YR	-
_			1	undulating	₽	4/2), voids up to 3/16" over 70% of	-
l _			·	86.75' - Fracture or mechanical break, 70	Ш	surface, cavities up to 1/2"	_
				deg, rough, stepped	Н	80.50-81.20' - Same as 79.85-80.5' except yellowish gray, (5Y 8/1), very	
-			>10	87.9-88.3' - Fracture zone or mechanical	ш	fine grained, medium strong (R3),	1
-	R8-NQ			break, rough, undulating, various angles 88.5' - Bedding plane, horizontal, smooth,	╁┸╂	voids up to 3/16" over 15% of	1
-	5 ft	67	2	undulating	丗廿	surface, fossil molds No Recovery 81.2-81.5'	-
_	90%			88.9' - Fracture or mechanical break, rough,	$\vdash$	Limestone	-
90			1	stepped, 1/2" open 89.1, 89.75, 90.65' - Bedding plane or —	Н	81.5-83.1' - Same as 80.50-81.20'	
-48.0			l '	fractures, smooth, undulating	Ш	except possible bioturbation	
1 -			1	89.4' - Mechanical break	H	<ul> <li>82.25-83.6' - few voids</li> <li>83.1-85.6' - strong HCl reaction,</li> </ul>	R8: 12 minutes
1 -	04.5		NR		口	weak to medium strong (R2 to R3),	
-	91.5			91.5-91.6' - Fractures or mechanical break	╂╫	<ul> <li>voids &lt;1/16" over 70-80% of surface,</li> </ul>	-
1 -			5	(3), rough, various angles, stepped to	口	cavities up to 3/4x1/2" over 30% of surface, few fossil molds, potential	-
1 -				undulating		bioturbation	] _
1			3	91.95' - Fracture, horizontal, rough, stepped, <1/2" open	Щ	85.95-86.5' - yellowish gray, (5Y 8/1),	]
1				92.25, 92.5-92.6' - Fractures, horizontal,	H	strong HCl reaction, very weak to	]
1 -	R9-NQ			rough, stepped	口	- weak (R1 to R2), voids up to 1/16" over 30%, cavities up to 1/4x1/8 "	1
-	5 ft	48	>10	92.9' - Fracture, horizontal, rough, stepped	╁┼┼	over 15% of surface	-
1 -	86%			93.7-94.25' - Fractures (>10)	口	86.5-87.9' - yellowish gray to dark	-
95			0	_	₽	yellowish brown, (5Y 8/1 to 10YR 4/2), very weak to medium strong	I ⊸
-53.0					口	(R1 to R3), voids <1/4" over 70 % of	]
1			_3_	95.65' - 70 deg, rough, undulating	H	surface, cavities <1/2x1/4" over	R9: 14 minutes
1 -	96.5		NR		Ш	30-40% of surface, possible	]
1 -	55.5				╁┼	bioturbation   87.9-91.0' - Same as 86.7-87.9'	-
1 -			>10	96.95' - Fracture or mechanical break, 0 to	世	except voids <1/4" over 40-70 % of	-
-				45 deg, rough, stepped	₽┦	surface, cavities <1/4x1/4" over	-
					Ш	10-20% of surface	
1							



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-05	SHEET	6	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723975.3 N, 457680.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

CORING	METHOD A	ND E	QUIPM	ENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW	casin	9	ORIENTATION : Vertical
WATER	LEVELS: 3.5	ft bg	s on 3/		/1/200		
>00	. (6			DISCONTINUITIES	ڻ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ООШ	OIR	ď	<u></u> ⊾ >10		S		
100 -58.0 -	R10-NQ 5 ft 40% 101.5	8	NR	97.15' - Fracture or mechanical break, horizontal, rough, stepped 97.15-98.3' - Fracture zone, rough, stepped, gravel up to 2" diameter, intersecting angles		Limestone  88.8-88.9' - Same as 87.9-91.0' except strong HCl reaction, mottled infilling with cavities, possible bioturbation, fossils prevalent No Recovery 91.0-91.5' Limestone  91.5-92.25' - very light gray and yellowish gray, (N8 and 5Y 8/1), strong HCl reaction, extremely weak to medium strong (R0 to R3), voids	R10: 5 minutes
_			1		#	up to 1/4" over 30% of surface,	SC-4 collected at 101.5- 102.4'
-			1	102.45' - Fracture, 30 deg, rough, undulating 102.8' - Fracture, 30 deg, rough, undulating	片	bioturbation Calcareous Fat Clay (CH)	
-	R11-NQ			103.3' - Mechanical break	H	92.25-92.60' - yellowish gray, (5Y - 8/1), moist, stiff to hard, high	-
-	5 ft 100%	69	2		Ħ	plasticity, strong HCl reaction, carbonate derived  Limestone	-
105_ -63.0			4	104.5, 104.35, 104.7, 105.1' - Bedding plane, <10 deg, rough, undulating – 105.2, 105.35' - Bedding plane, <10 deg,	Ē	92.6-95.8' - Same as 91.5-92.25' <b>No Recovery 95.8-96.5'</b>	_
_	106 F		0	rough, undulating 105.7' - Mechanical break		<ul> <li>95.8-96.5"</li> <li>Limestone</li> <li>96.5-98.5" - yellowish gray, (5Y 7/2),</li> </ul>	R11: 7 minutes
-	106.5		>10	106.65-107.25' - Fracture zone, rough, undulating, intersecting fractures at various angles, gravel up to 1-1/2" diameter	Ħ	<ul> <li>very fine to fine grained, strong HCl reaction, extremely weak (R0), friable, voids up to 1/4" over 30% of surface, few cavities with infill up to</li> </ul>	-
-			0	107.5' - Bedding plane, horizontal, rough, undulating 108.1' - Mechanical break		1/4"x1/8", fossiliferous, trace organics  No Recovery 98.5-101.5'	
-	R12-NQ 5 ft 80%	53	1	108.95' - Fracture or bedding plane, horizontal, rough, undulating	Ħ	Limestone 101.5-104.8' - yellowish gray, (5Y 7/2), very fine to fine grained, strong	-
110_ -68.0			5	109.85, 110.25, 110.35, 110.4' - Bedding plane, horizontal, rough, undulating, tight to	崫	HCl reaction, extremely weak to very weak (R0 to R1), voids up to 3/16"  over 50-70% of surface, cavities up	_
-	111.5		NR	<1/2" open	Ħ	to 1/2" over 30% of surface, fossiliferous with infilled cavities and fossil molds, trace organics	R12: 6 minutes
-			2	111.6' - horizontal, smooth, undulating, 1/6" open, loose 111.9' - horizontal, smooth, undulating, 1/12"		104.8-105.05' - Same as 101.5-104.8' except laminated bedding	
-			6	open, loose 112.55' - Bedding plane, horizontal, smooth,	井	<b>Limestone</b> 105.05-106.5' - Same as 101.5-104.8	
-	R13-NQ 5 ft 100%	30	2	undulating 112.9' - Mechanical break 113.1' - Fracture, 40 deg, smooth, undulating	H	106.5-110.5' - Same as 104.8-105.05' except voids <1/4" over <20% of surface, many fossil	-
115_ -73.0	100 70		3	113.3, 113.4, 113.5' - Fractures, 20 to 65 deg, smooth, undulating 113.85' - Fracture, 40 deg, smooth,		casts and cavities up to 1/2" diameter No Recovery 110.5-111.5'  Limestone	_
-	116 5		7	undulating 114.05' - Bedding plane, horizontal, smooth, undulating	Ħ	_ 111.5-116.5' - Same as 106.5-111.5' except few cavities 3/4"x1/4" _	R13: 8 minutes
-	116.5		>10	115.2' - Fractures, 0 to 80 deg, smooth, undulating 115.4, 115.5' - Fractures, 35 deg and vertical, smooth, undulating		Limestone - 116.5-118.7' - Same as 111.5-116.5' except secondary infill in a few fossil molds	-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-05	SHEET	7	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723975.3 N, 457680.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 3.5	ft bg	s on 3/	06/07 START : 2/26/2007 END : 3/	1/200	7 LOGGER : T. Valentine, R. Bitely	, J. Schaeffer
				DISCONTINUITIES	ß	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 120 -78.0	R14-NQ 5 ft 44%	12	>10 1 NR	115.95-116.3' - Fractures (6+), rough, undulating, intersecting at various angles 116.6' - Bedding plane, horizontal, smooth, undulating 116.6-117.7' - Fracture zone, rough, undulating, multiple intersecting fractures, gravel < 1-1/2" diameter 118.35, 118.55' - Fractures, 55 deg, smooth,		No Recovery 118.7-121.5'	- - - R14: 4 minutes
-	121 5			undulating	口	-	-
_	121.5		0			Limestone - 121.5-123.65' - Same as 116.5-121.5' except grading into	SC-5 collected at 121.5- 122.6'
_			3	122.6, 124.3' - Mechanical break 122.95' - Bedding plane, horizontal, smooth, undulating		weak rock with depth (R2)	-
-	R15-NQ 5 ft 100%	76	0	123.3' - Fracture, 35 deg, smooth, undulating 123.65' - Fracture, 20 deg, smooth, undulating undulating		- 123.65-125.0' - Same as 121.5-123.65' except weak to - medium strong (R2 to R3), highly	-
125_ -83.0_			3	125' - Bedding plane, horizontal, smooth, undulating		fossiliferous, voids <1/4" over 50-70% of surface, cavities <3/4" x1/2" over 40% of surface	
_	126.5		6	125.4, 125.45, 125.6, 125.7, 125.75, 125.9, 126.15, 126.25' - Bedding plane, horizontal, smooth, undulating	H	125.0-125.45' - Same as 123.65-125.0' 125.45-126.5' - Same as	R15: 5 minutes
-			2	126.85, 126.95' - Bedding plane, horizontal, smooth, undulating		123.65-125.0'  Limestone  126.5-131.4' - very fine to fine	-
-	D40 NO		0	127.2, 129.3, 129.45, 129.6, 130.25' - Mechanical break	H	grained, strong HČl reaction, very weak to weak (R1 to R2), voids (< 3/16") variable 0-30% of surface,	-
_	R16-NQ 5 ft 98%	82	0			(especially at 127.05-128.5' and 129.6-131.4'), cavities (<1/4") over 20% of surface from 129.6-131.4',	-
130 -88.0			0			fossiliferous (molds/casts), secondary infill in molds 127.05-128.5' - Same as	R16: 7 minutes
-	121 5		0	-	H	125.45-126.5' except many fossil molds and casts with few secondary	-
-	131.5		NR)	131.65' - Fracture, <10 deg, rough,		infill of molds 128.5-129.6' - Same as 121.5-123.65	-
_			5	undulating 132.05, 132.35' - Bedding plane, horizontal, smooth, undulating		129.6-131.4' - Same as 128.5-129.6 except many fossil molds and casts with few secondary infill of molds	-
_	R17-NQ	54	>10	132.35-132.5' - Fractures, smooth, undulating, perpendicular fractures 0 and 90 degrees		No Recovery 131.4-131.5'   Fat Calcareous Clay (CH)   131.5-131.55' - yellowish gray, (5Y	-
135	5 ft 100%	J <del>4</del>	1	132.65' - Bedding plane, horizontal, smooth, undulating, <1/4" open 132.85, 133.05, 133.1, 133.25, 133.3, 133.45'		7/2), moist to wet, soft, high plasticity  Limestone 131.55-132.6' - yellowish gray, (5Y	_
-93. <del>0</del> -			5	- Bedding plane, horizontal, smooth, undulating 133.45-133.55' - Fracture zone, horizontal,		7/2), strong HCl reaction, very weak to weak (R1 to R2), voids <1/4" over 20-70% of surface, variable, cavities	R17: 6 minutes
-	136.5		7	rough, undulating, gravel <1/2", angular 133.6' - Bedding plane, horizontal, smooth, undulating		<1/4" diameter over 20% of surface, variable, fossil molds throughout with some infilling	-
_			'	135.05' - Fracture, 40 deg, smooth, undulating, <1/4" open			_



P	ROJECT NUMBER:	BORING NUMBER:					
l :	338884.FL	A-05	SHEET	8	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723975.3 N, 457680.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 3.5	ft bg	s on 3	06/07 START : 2/26/2007 END : 3/	1/200	7 LOGGER : T. Valentine, R. Bitely	, J. Schaeffer
				DISCONTINUITIES	(J	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		SII.	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OUTE AND DEDTH OF GARNING
ᆲ빓읃	RUF A.H.	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	1 3	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F F F	NGT CO	Ø	ACT R F(	PLANARITY, INFILLING MATERIAL AND	MB(	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
BS급	잉크뿝	R O	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
			2	135.4' - Fracture, 30 to 50 deg, smooth,		132.6-133.0' - Same as	
_	R18-NQ			undulating 135.55,135.6, 135.80, 136.3, 136.5' -	T	- 131.55-132.6' except light olive brown, (5Y 5/2), very fine to fine	<b> </b>
-	5 ft 100%	58	0	Fractures, <10 deg, smooth, undulating	╁	grained, weak to medium strong (R2	
	100 /6			136.65, 136.75, 137.05, 137.1, 137.2, 137.25,	Ľ	- to R3), few fossils, voids <1/4" over	-
140 -98.0			5	137.4, 137.6' - Bedding plane, 0 to 10 deg, smooth, undulating	╫	5% of surface, fossil molds <1/8" 133.0-136.5' - Same as	<u> </u>
-				138.4' - Fracture, 15 deg, rough, undulating	$\blacksquare$	- 131.55-132.6'	R18: 7 minutes
_			5	139.65, 139.75, 140.0, 140.3, 140.35, 140.9, 141.1, 141.15, 141.3, 141.45, 141.5' -	$\vdash$	Limestone 136.5-137.1' - yellowish gray, (5Y	- Trio. 7 minutes
_	141.5			Bedding plane, horizontal and <10 deg,		- 7/2), very fine to fine grained, strong	_
_			1	undulating, rough to smooth		HCl reaction, very weak to weak (R1	_
_			·	141.65' - Bedding plane, <10 deg, smooth, undulating	Щ	to R2), variable 0-30% 15-20% of surface, cavities (<1/2"), variable	
			1	142.6' - Mechanical break		15-20% of surface, fossiliferous, trace	
			'		$\vdash$	molds and laminated bedding, rare secondary infill of cavities	1
-	R19-NQ			143.35' - Fracture or mechanical break, 20 - deg, rough, stepped	H	137.1-137.25' - Same as	_
_	5 ft 86%	42	4	143.65' - Fracture, horizontal, rough,		136.5-137.1' except pale yellowish	-
145	0070			undulating -	╙	brown to moderate yellowish brown to moderate yellowish brown, (10YR	-
145_ -103.0			>10	144.05' - Fracture, horizontal, rough, undulating	仜	6/2 to 10YR 5/4), medium strong	_
-			5	144.3-145.05' - Fracture zone, rough,	+	L (R3)	R19: 24 minutes
_			NR	intersecting fractures at various angles, <1" gravel, angular, stepped to undulating, partial		137.25-139.75' - Same as - 136.5-137.1'	- TV10. 24 Hilliates
_	146.5			recovery -		_ 139.75-140.0' - Same as	
_			1	145.25' - Bedding plane, horizontal, rough,	$oldsymbol{oldsymbol{\sqcup}}$	137.1-137.25' - 140.0-141.5' - Same as 136.5-137.1'	SC-6 collected at 146.5- 147.4'
_				undulating 145.45' - Fracture, vertical, smooth,		Limestone	_
_			0	undulating	Н	141.5-145.5' - dark yellowish brown to pale yellowish brown, (10YR 4/2 to	_
			"	145.55, 145.65, 146.15' - Bedding plane, horizontal, smooth, undulating		10YR 6/2), very fine to fine grained,	
	R20-NQ			145.8, 146.05, 146.35' - Fractures (3),		strong HCl reaction, weak to medium	
_	5 ft 98%	90	2	vertical, smooth, undulating 147.45' - Bedding plane, horizontal, smooth,	$\mathbb{H}$	strong (R2 to R3), with extremely weak (R0) zone at 141.6-141.65',	1
150				undulating		voids (<3/16") over 10-50% of	_
-108.0			2	148.35' - Mechanical break	T	<ul> <li>surface, cavities and fossil molds (up to 1" diameter) over 40% of surface,</li> </ul>	
-				149.15, 149.25, 149.75, 150.0, 150.75, 151.4' Bedding plane, horizontal and <10 deg,	Ь-	about 50% of cavities have	R20: 10 minutes
1 -	454.5		1	smooth, undulating	岸	secondary infill, very fossiliferous     (molds)	-
1 -	151.5		NR.	-	╀	(molds) 145.5-145.8' - pale yellowish brown,	
-			0	-	$\Box$	<ul> <li>(10YR 6/2), very fine grained, strong</li> </ul>	-
-				-	士	HCI reaction, medium strong (R3), laminated bedding, voids (<3/16")	-
-			0	152.75, 153.2, 153.35' - Mechanical break	$\vdash$	over 0-20% of surface	-
1 -					片	No Recovery 145.8-146.5' Limestone	-
1 -	R21-NQ 5 ft	80	6	153.85, 153.9, 154.05, 154.15, 154.3, 154.35,  -	世	<ul> <li>146.5-151.4' - pale yellowish brown,</li> </ul>	]
_	94%		L	154.9, 155.0' - Bedding plane, 0 to 10 deg,		(10YR 6/2), very fine to fine grained,	_
155			2	smooth, undulating	Ш	strong HCl reaction, weak to medium strong (R2 to R3), voids (<3/16")	
-113.0				_	$\vdash$	over 0-20% of surface (voids <1/4"	
1 -			0	155.55, 155.65' - Mechanical break	Ħ	over 80% of surface from 150.7-151.05'), few cavities	R21: 11 minutes
1 -	156.5		NR	-	₽	150.7-151.05), lew cavilles <3/4"x1/2", few cavities with infill,	
-	150.0		INK	- 156.6' - Bedding plane, horizontal, smooth,	仠	fossiliferous	SC-7 collected at 156.55-
1 -			1	undulating	仜	150.7-151.4' - Same as 146.5-150.7' except voids <1/4" over 80% of	157.55'
-				- 157.6' - Mechanical break	╁	- surface	-
				107.0 - Miconamical break	f	No Recovery 151.4-151.5'	-
1					1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-05	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723975.3 N, 457680.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 3.5	ft bgs	s on 3	/06/07 START : 2/26/2007 END : 3/	1/200	7 LOGGER : T. Valentine, R. Bitely	, J. Schaeffer
>00	(9			DISCONTINUITIES	ى ق	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
160 -118.0 -	R22-NQ 5 ft 96%	71	8 6 0 0 NR	157.75, 157.8, 157.9, 158.0' - Bedding plane, horizontal, smooth, undulating 158.1' - Fracture, vertical, smooth, undulating 158.15, 158.25, 158.3' - Bedding plane or mechanical break, 0 to 90 deg, smooth, undulating 158.6, 158.65, 158.75, 158.9, 159.15' - Bedding plane, horizontal, smooth, undulating 160.1, 160.65, 161.05' - Mechanical break		Limestone  151.5-154.95' - Same as 150.7-151.05' except yellowish gray to dark yellowish brown, (5Y 7/2 to 10YR 4/2), weak to medium strong (R2 to R3) 151.60-151.65' - Same as 151.5-154.95' except voids <1/4" over 60% of surface 151.65-153.2' - Same as 151.60-151.65' except no voids, few cavities <1/4" diameter 153.2-154.2' - Same as 151.65-153.2' except voids <1/8" over 30-60% of surface 154.2-154.92' - Same as 153.2-154.2' except highly laminated with organics, voids <1/4" over <10-20% of surface Limestone 154.95-156.2' - Same as 154.2-154.92' except very weak to weak (R1 to R2), voids <1/8" over <10-20% of surface No Recovery 156.2-156.5' Limestone 156.5-157.95' - Same as 154.95-156.5' except pale yellowish brown to very light gray, very fine grained, voids < 1/4" over 20-40% of surface 157.95-158.6' - Same as 156.5-157.95' except pale yellowish brown to very light gray, (10YR 6/2 to N8), very fine grained, medium strong (R3), <10% voids over surface, few cavities <1/4"x1-1/2" with infill 158.6-161.3' - Same as 157.95-158.6' except yellowish gray, (5Y 7/2), very fine to fine grained, weak (R2), voids <1/4" over 40-70% of surface No Recovery 161.3-161.5' Bottom of Boring at 161.5 ft bgs on 3/1/2007	R22: 12 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-06	SHEET	1	OF	9	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723934.5 N, 457719.1 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8 tri-cone bit

						tary, carriedu, Avvo rous, o			Official Vertical		
WATER	LEVELS	: 1.0 ft bo	gs on 03/0	)9/07 S	START : 3/6/2007	END : 3/9/2007	LOGGE	R : R.	Bitely, L. Prochaska		
,				STANDARD		SOIL DESCRIPTION		σ	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				SYMBOLIC LOG			
표원한		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR				DEPTH OF CASING, DRILLING RATE,		
H X K				0" 0" 0"		E CONTENT, RELATIVE L NCY, SOIL STRUCTURE, I		ABC	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION		
			#TYPE	6"-6"-6" (N)	0011010121	NOT, GOIL OTTIOOTOTIL, I	VIIIVELIVILOGI	N.	INCTROMENTATION		
42.5				(,				Ť			
-								4	-		
l _								1	_		
								1	1		
-								1	1		
-								1	-		
-								4	_		
	3.5								_		
					Poorly Grade	d Sand With Silt (SP-SM	<b>1</b> )				
-		1.3	SS-1	4-4-4	3.5-4.1 - dark	yellowish orange, (10YF e to fine grained, 10-15%	( 6/6), Wet,		1		
				(8)		ganics, trace coarse san		<b>-</b>	-		
5 37.5	5.0				cemented san	nd concretions, sand is si	lica /-	<b>-</b>	1 ⊣		
37.5					Clavey Sand (	(SC)		1	_		
					4.1-4.8' - pale	yellowish brown, (10YR	6/2), moist,				
						e to fine grained, 40% m race organics, sand is si		1	1		
-					piastic filles, ti	race organics, sand is si	ica	1	1		
-								1	-		
-								4	_		
								J			
	8.5										
-	0.0				Silt (ML)			†Ш	1		
-		1.0	SS-2	5-5-6	8.5-9.5' - dark	yellowish orange, (10YF	R 6/6), wet, stiff,	1111	-		
-		1.0	55-2	(11)	nonplastic, rap	oid dilatancy, moderate h	ICI reaction,	ΨШ	-		
10	10.0				grained sand,	grained sand, 5% medic	im to coarse				
32.5					(9.4	an oar sorrato					
								1	1		
-								1	1		
-								-	-		
-								4	_		
									_		
1 7	13.5							1	]		
-	13.5			00.50/5.5	Silt With Sand	d (ML)		1111	1		
-		0.8	SS-3	38-50/5.5 (88/5.5")	13.5-14.25' - g	grayish orange, (10YR 7/	4), moist to wet,	4	-		
_	14.5			(00/0.0 )	hard, nonplast     hard     hard	tic, rapid dilatancy, mode	rate HCI	1'''	1		
15_						5% very fine sand-sized ace fine gravel-sized, all					
27.5					Sanu-Sizeu, Ila	ace inie graver-sizeu, all	carbonale	1	]		
1 -								1			
-								1	-		
-								4	]		
								1			
1 7								1	]		
-								1	Driller's Remark: Hard layer 18.0-21.0'		
-	18. <u>5</u> 18.7	0.2	SS-4	50/2		aamonte		┿	-		
		/	33-4	(50/2")	18.5-18.7' - or	agments ayish orange, (10YR 7/4	) mild HCI /	1	]		
				(55/2)	reaction, fragn	ments to 3/8"	,,d				
20								1	]		
							_	1			
								1			



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-06	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723934.5 N, 457719.1 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8 tri-cone bit

WATER	LEVELS	: 1.0 ft bo	gs on 03/0	09/07	START : 3/6/2007 END : 3/9/2007 LOGGE	GER : R. Bitely, L. Prochaska					
>				STANDARD	SOIL DESCRIPTION	_ g	COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	COLL NAME LICCO OPOLID OVANDOL COLOD	SYMBOLIC LOG	DEDTIL OF CACINO DRILLING DATE				
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	J S	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND				
EPT URF LEV			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	X ME	INSTRUMENTATION				
<u>22.5</u>				(N)		10)					
-						-	-				
-						┨	-				
-						┨	-				
-						┨	-				
-						┨	-				
-	23.5					1	1				
-	20.0				Silty Sand (SM)	111	7				
-		1.1	SS-5	10-13-24	23.5-24.6' - grayish orange, (10YR 7/4), wet, dense, rapid dilatancy, moderate HCl reaction, fine to coarse	11	1				
25	25.0			(37)	$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	1	<u> </u>				
17.5					\at 24.4-24.5', all carbonate	1					
-						1	Driller's Remark: Very hard layer 25.5-27.0'				
						1	1				
						]					
						┨	_				
	28.5					1	_				
_				31-50-50/5	Silt With Sand (ML) 28.5-29.9' - dark yellowish orange, (10YR 6/6), moist	411	_				
_		1.4	SS-6	(100/11")	to wet, hard, nonplastic, rapid dilatancy, moderate HCl	411	_				
30 <u> </u>	29.9				reaction, 30% fine to medium sand-sized (amount varies in lenses), all carbonate	₩	H				
12.5						-	Driller's Remark: Very hard layer 30.0-35.0'				
-						4	-				
-						-	-				
-						-	-				
-						┨	-				
-	00.5					┨	-				
-	33.5 33.8	0.3	SS-7	50/3.5	_ Limestone Fragments	$\pm$	₫ -				
-				(50/3.5")	33.5-33.8' - grayish orange, (10YR 7/4), mild HCl reaction, gravel-sized fragments (1/16"-1"), 75%	1	-				
35					coverage of <1/16" voids on fragment surfaces	1	1				
7.5					_	1					
-						1	1				
-						1	1				
						1	1				
						1	1				
1 7						]	1				
	38.5 38.8					L	Driller's Remark: Hard layers 38.0-38.5' and 38.5-42.0'				
	38.8	0.3	SS-8	50/3 (50/3") /		F					
				(55/5)	h	厂	]				
40						_					



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	A-06	SHEET	3	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723934.5 N, 457719.1 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8 tri-cone bit

LEVELS	: 1.0 ft bo	s on 03/0	)9/07 S	TART : 3/6/2007 END : 3/9/2007 LOGGER : R. Bitely, L. Prochaska
			STANDARD	SOIL DESCRIPTION 5 COMMENTS
SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	RECOVE	:RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
		#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
			(14)	Limestone Fragments Dense drilling 40.0-43.0', light chatter
				38.5-38.8' - moderate yellowish brown, (10YR 5/4),   -   variable   variable
				fragments up to 2" diameter, 70-80% coverage of
				<1/16" voids on fragment surfaces
				] [
				<u> </u>
43.5	0.0	00.0	F0/0 F	_ <del></del>
43.8	0.3	_55-9_	50/3.5 \ (50/3.5") /	Limestone Fragments  43.5-43.8' - pale yellowish brown, (10YR 6/2), mild
				HCI reaction, coarse sand-sized to fine gravel-sized / _ fragments (1/16"-1"), 2" silt lense (ML) at bottom of
				sample —
				11
				11
48.5				
			40 15 20	Limestone Fragments  48.5-49.0' - Same as 43.4-43.8' except fragments
	1.3	SS-10	(35)	1/2"-2"
50.0				Sandy Silt (ML)  49.0-49.8' - dark yellowish brown, (10YR 4/2), moist to
				wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 35-40% fine to coarse sand-sized,
				gravel-sized limestone lense at 49.6-49.8', all
				carbonate
				1
				]
53.5				
53.9	0.4	SS-11	50/5 (50/5")	Limestone Fragments
				reaction, sand and gravel-sized
				Dense drilling 56.0-57.0', light chattering
				1
				11
58.5	0.1	CC 10	E0/4	Stop drilling at 18:30 on 3/6/07, set HW
58.6	U.1/	\33-12)	(50/1")	58.5-58.6' - light olive gray, (5Y 5/2), mild to moderate /
				HCI reaction, only a single 2" fragment  Begin Rock Coring at 58.5 ft bgs
				See the next sheet for the rock core log
	43.5 43.8 48.5 50.0	SAMPLE INTERVA  RECOVE  43.5 43.8 0.3  48.5 50.0  53.5 53.9 0.4	SAMPLE INTERVAL (ft) RECOVERY (ft) #TYPE  43.5 43.8 0.3 SS-9  48.5 1.3 SS-10 50.0  53.5 53.9 0.4 SS-11	SAMPLE INTERVAL (ft) RECOVERY (ft)  #TYPE 6"-6"-6" (N)  43.5 43.8 0.3 SS-9 50.0 1.3 SS-10 53.5 53.9 0.4 SS-11 58.6 0.1 SS-12 50/1



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-06

SHEET 4 OF 9

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723934.5 N, 457719.1 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 1.0	ft bg	s on 0	3/09/07 START : 3/6/2007 END : 3/	9/200	7 LOGGER: R. Bitely, L. Prochask	a
≩ D ⊋	(%			DISCONTINUITIES	] g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B FACE	E RU 3TH, OVE	(%) Q	FOC	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR LEN REC	RQI	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	58.5			59.7. 50.4! Mochanical brook (2)		Limestone	3/7/07 advanced HW
-			2	58.7, 59.4' - Mechanical break (2) 58.85, 59.1, 59.5' - Bedding plane (3), 40	世	<ul> <li>58.5-61.4' - pale yellowish brown, (10YR 6/2), very fine to fine grained,</li> </ul>	casing to 58.5'
60	R1-NQ			deg, smooth, undulating	Ъ	strong HCl reaction, medium strong	<u> </u>
-17.5	3 ft 97%	68	4	– 60.25' - Bedding plane or fracture, horizontal,	$\top$	— (R3) at 58.5-59.0' grading to very weak (R1) at 59.0-61.4', 80%	_
			3	smooth, undulating, intersecting high angle	$oxed{\Box}$	coverage of <1/16" voids on surface from 58.5-59.0', trace voids and few	R1: 3 minutes
	61.5		NR/	fracture 60.3' - Fracture, 75 deg, smooth, undulating	片	cavities <1/4" diameter from	_
_			O O	60.8, 61.0' - Bedding plane (2), horizontal, smooth, undulating	Ħ	59.0-61.4'  No Recovery 61.4-61.5'	_
_				60.9' - Fracture, 80 deg, smooth, undulating,	片	Limestone	_
_			>10	tight 62.55, 62.65' - Bedding plane (2), horizontal,	世	61.5-66.1' - pale yellowish brown, (10YR 6/2), very fine to fine grained,	-
_	DO NO			smooth, undulating	₽	moderate to strong HCl reaction, very weak to medium strong (R1 to	-
_	R2-NQ 5 ft	62	2	62.65-62.8' - Fracture zone, rough, undulating, >10 fractures at various angles	F	<ul> <li>R3), 60% coverage of &lt;1/16" voids</li> </ul>	-
	92%			63.1, 63.2, 63.6' - Fractures or mechanical break (3), smooth to rough, undulating, low	厂	on surface from 64.75-65.25', trace voids and few cavities up to	-
65 <u> </u>			2	angle –	世	3/4"x1/12" 61.5-64.75' and	
			40	64.1, 65.0' - Bedding plane or mechanical break (2), smooth to rough	世	65.25-66.5', trace organics in laminations	R2: 10 minutes
-			10 NR	64.45-65.95' - Fracture zone, rough,	$\pm$	_ No Recovery 66.1-66.5'	-
-	66.5		INIX	undulating, 5+ fractures at intersecting angles	╁	Limestone	Many cavities or lost
-			>10	65.75' - Bedding plane, smooth, undulating 65.75' - Fracture, 40 deg, smooth, undulating	F	<ul> <li>66.5-70.3' - moderate yellowish brown to dark yellowish brown,</li> </ul>	material from coring at - 66.5-68.15'
-				66.5-67.8' - Fracture zone, rough, undulating	匚	(10YR 5/4 to 10YR 4/2), fine grained,	00.5-06.15
-			>10	to stepped, intersecting fractures at various angles	Ħ	<ul> <li>moderate to strong HCl reaction, very weak to medium strong (R1 to</li> </ul>	-
_	R3-NQ			68.05, 68.15' - Bedding plane or mechanical	╁	R3), hardness increasing with depth,	-
_	5 ft 76%	40	2	break (2), <10 deg, rough to smooth, undulating	$\vdash$	<ul> <li>60% coverage of &lt;1/16" voids on surface, no cavities 68.15-70.3',</li> </ul>	-
70			0	69.25, 69.4' - Bedding plane, <10 deg, smooth, undulating —	brack	67.7-67.8' silt lense, carbonate, low plasticity	_
-27.5				69.75, 71.85, 72.5, 74.9' - Mechanical break	$oldsymbol{oldsymbol{eta}}$	- No Recovery 70.3-71.5'	
_			NR	(4)	╨		R3: 8 minutes
_	71.5				╨		_
_			1		上	Limestone - 71.5-75.3' - pale yellowish brown to	-
-				72.1, 72.6' - Bedding plane (2), <10 deg, smooth, undulating	上	very light gray, (10YR 6/2 to N8),	-
_			1	SSaii, ariadidang	$\pm$	very fine to fine grained, moderate  HCl reaction, medium strong (R3) at	-
-	R4-NQ				lacksquare	71.5-75.15', very weak to extremely weak (R1 to R0) at 75.15-75.3',	-
_	5 ft	68	1	74.05' - Fracture, 20 deg, smooth, undulating	$\Box$	<ul> <li>25-75% coverage of &lt;1/16" voids on</li> </ul>	-
	76%			74.05 - Fracture, 20 deg, smooth, undulating 74.5, 74.65' - Bedding plane (2), <10 deg,	븎	surface, many cavities <1/4" diameter with few cavities <1/2"	-
75 <u> </u>			3	smooth, undulating —	廿	— (fossil molds), fossiliferous	-
-				75.15' - Fracture, 20 deg, rough, undulating	廿	- No Recovery 75.3-76.5'	R4: 16 minutes
-	76.5		NR		世	-	-
-	7 0.0			76.5-76.6' - Fracture zone, rough, undulating	世	Limestone	<u>-</u>
-			>10	to stepped, trace silt infill 76.7' - Mechanical break or bedding plane,		76.5-76.9' - pale yellowish brown, (10YR 6/2), very fine to fine grained,	·
_			NIA.	<10 deg, rough, undulating		strong HCl reaction, very weak (R1),	-
			NA	76.9, 78.25' - Clay seam (2), clay contact		- \20% coverage of <1/16" voids on surface	-
					T		
I			I		1		1



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723934.5 N, 457719.1 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 1.0	) ft bg:	s on 0	3/09/07 START : 3/6/2007 END : 3/	9/200	7 LOGGER : R. Bitely, L. Prochask	a
<b>₹</b> □ ⊊	(%)			DISCONTINUITIES	ဉ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B FACE	E RL 3TH, OVE	(%) Q	STUF F00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP' SUR! ELE\	COR	RQ	FRAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMI	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	R5-NQ			78.4' - Mechanical break or bedding plane,	世	Fat Clay (CH)	Laminated organics varve-
_	5 ft 86%	20	0	<10 deg, smooth, undulating 78.55' - Mechanical break or fracture, 50-70	ш	-\ 76.9-78.25' - very pale orange, (10YR 8/2), moist, medium stiff to	like deposition at 79.4-79.5' -
80				deg, smooth, undulating	╁	stiff, low dilatancy, moderate to high	1
-37.5			4	78.75, 79.2, 79.3' - Bedding plane (3), <10 — deg, smooth, undulating	H	—∖plasticity, 30% silt Limestone	
-			0		Ħ	78.25-80.8' - very light gray to dark	R5: 10 minutes
	81.5		NR		Ħ	yellowish brown, (N8 to 10YR 4/2), very fine to fine grained, weak to	1
_			>10	81.6' - Fracture or mechanical break, <10	H	medium strong (R2 to R3), 40%	81.5-82.75' possible bioturbation, 82.75-83.2'
			_10	deg, rough, undulating 81.8-82.0' - Fracture zone, rough, undulating,	$\vdash$	<ul> <li>coverage of &lt;1/16" voids on surface varying/decreasing with depth,</li> </ul>	wormholes/bioturbation _
			2	multiple intersecting factures at various	F	laminated organics 79.4-79.5'  No Recovery 80.8-81.5'	SC-1 collected at 82.25- 83.2'
_	_			angles 82.25, 83.2, 83.4, 84.6' - Mechanical break or	oxday	Limestone	_
_	R6-NQ 5 ft	54	0	fractures (4), rough, stepped to undulating, variable angularities	Þ	81.5-82.75' - pale yellowish brown to moderate yellowish brown, (10YR 6/2	_
-	86%			variable arigularities	口	to 10YR 5/4), very fine to fine	_
85 <u>-</u> 42.5			2	_	上	grained, weak to medium strong (R2 — to R3), 70% coverage of <1/16" voids	_
-42.5			4	85.3' - Mechanical break or fracture, 0-50	╁	on surface, 20% coverage of <1/2" cavities on surface, several cavities	R6: 16 minutes
_			NR	deg, rough, stepped 85.55-85.8' - Fracture zone, rough,	H	<1/2" with secondary infill, all acid	No. 10 minutes
-	86.5			undulating, multiple (<4) fractures, various	F	reactive 82.75-83.2' - Same as 81.5-82.75'	-
-			>10	angles	片	<ul><li>except 30% coverage of &lt;3/16" voids</li></ul>	-
-				87.2' - Fracture, 35 deg, rough, undulating 87.35-87.8' - Fracture zone, rough,	片	on surface, 15-20% coverage of <1/4" cavities on surface	
-			>10	undulating to stepped, multiple fractures at		<ul> <li>83.2-85.8' - Same as 81.5-82.75'</li> <li>except 80% coverage of &lt;3/16" voids</li> </ul>	-
-	R7-NQ			various angles 87.95, 88.9, 89.3' - Mechanical break (3)	屽	on surface, 30% coverage of <1/2"	
-	5 ft 76%	58	0	89.0' - Mechanical break or bedding plane,	F	L cavities on surface, fossiliferous No Recovery 85.8-86.5'	
90	7070		10	40 deg, rough, undulating 89.2-89.3' - Fracture zone, rough, undulating	厈	Limestone	
-47.5			10	to stepped, intersecting fractures at various	仜	86.5-90.3' - pale yellowish brown to dark yellowish brown, (10YR 6/2 to	-
_			NR	angles	世	10YR 4/2), very fine to fine grained, mild to moderate HCl reaction, very	R7: 23 minutes
_	91.5		INIX		$\perp$	weak to medium strong (R1 to R3),	1
	-		>10	91.6' - Fracture, vertical, rough, undulating	$\vdash$	- 60% coverage of <1/16" voids on surface, many cavities <1"x1/4" over	1
			/10	91.65' - Mechanical break or fracture, 15 deg, rough, stepped to undulating	F	20-30% of surface, fossiliferous, mottled coloration, weak to moderate	]
-			2	91.85' - Fracture, vertical, rough, undulating	片	HCL reaction, trace organics	]
_				92.05-92.2' - Fracture zone, rough, undulating to stepped, multiple fractures at	Ħ	No Recovery 90.3-91.5' Limestone	<u> </u>
_	R8-NQ 5 ft	58	1	various angles 92.95' - Mechanical break or fracture, 25-70	H	91.5-92.2' - dark yellowish brown to	_
_	90%		· .	deg, rough, undulating, variable fracture	片	pale yellowish brown, (10YR 4/2 to 10YR 6/1), very fine to fine grained,	_
95 <u>-</u> -52.5			2	angle 93.3' - Bedding plane, horizontal, smooth, —	$\vdash$	strong HCl reaction, extremely weak	
-52.5			_	undulating	$\vdash$	to very weak (R0 to R1), voids <3/16" over 80% of core surface, few	SC-2 collected at 95.05- 95.85'
-			1	94.1' - Bedding plane, smooth, planar 94.25-94.35' - Clay seam, soil horizon	厂	cavities (<1/4") over 20% of surface 92.2-93.0' - Same as 91.5-92.2'	R8: 29 minutes
-	96.5		NR	94.7' - Fracture, 35 deg, rough, stepped 95.0' - Mechanical break, 70 deg, rough,	仜	<ul> <li>except weak to medium strong (R2 to</li> </ul>	96.5-96.85' hammer test
-			1	undulating	世	R3), fossiliferous, voids <3/16" over 60% of core surface, decreasing with	for calibration (50/4")
-				95.05' - Clay seam, soil horizon, clay contact <1/4", potential fracture infill, open 1/4"	$\Box$	<ul> <li>depth, cavities up to 2-1/2"x1" with</li> </ul>	Top 4" of core lost to hammer test for calibration.
-			>10	95.85' - Mechanical break or fracture, 15 deg,	$ar{\Box}$	extremely weak (R0) limestone or silt infill	measurements of core -
-				rough, stepped	f		depths start from 96.85'
					1		



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33884.FL

BORING NUMBER:

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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723934.5 N, 457719.1 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 1.0	ft bgs	s on 03	3/09/07 START: 3/6/2007 END: 3	/9/200 <sup>-</sup>	7 LOGGER : R. Bitely, L. Prochaski	а
×0.0	(9)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 100 -57.5 -	R9-NQ 5 ft 82% 101.5	5 ft 82%					R9: 7 minutes
- - - - -	R10-NQ 5 ft 99%	97	0 1 0	101.95, 103.3, 103.6, 105.0' - Mechanical break (4)  103.15' - Mechanical break or fracture, 40 deg, rough, stepped		(R1 to R3), voids <3/16" over 60-80% of core surface, few cavities (<1/2"x1/4"), horizon of greenish black (5GY 2/1) fat clay (moist, soft to medium stiff, highly plastic, mild HCl reaction) at 94.25-94.35' No Recovery 96.0-96.85' Limestone 96.85-100.6' - pale yellowish brown,	- - - - -
105 -62.5 - -	106.5		0 0 NR/	400 OFL Freehore OD des revels abouted		(10YR 6/2), very fine to fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), 60% coverage of <3/16" voids on surface, 20% coverage of <3/4"x1/2" cavities on surface, fossiliferous  No Recovery 100.6-101.5' Limestone	R10: 13 minutes -
- - - 110 -67.5	R11-NQ 5 ft 94%	60	2 2 3 0	106.85' - Fracture, 30 deg, rough, stepped 107.4' - Fracture or mechanical break, 70 deg, smooth, stepped, open  108.5' - Bedding plane, horizontal, smooth, undulating, 1/2" open 108.7' - Fracture or mechanical break, 60 deg, smooth, stepped 109.0' - Bedding plane, horizontal, smooth, undulating 110.15, 110.25' - Bedding plane (2), <10 deg, rough, stepped		101.5-106.45' - pale yellowish brown, (10YR 6/2), very fine to fine grained, extremely weak to very weak (R0 to R1), 60% coverage of <3/16" voids on surface, few cavities <1/2" diameter, fossiliferous with fossil molds, trace organics No Recovery 106.45-106.5' Limestone 106.5-111.2' - pale yellowish brown, (10YR 6/2), very fine to fine grained, extremely weak to weak (R0 to R2),	R11: 16 minutes
- - - - 115 -72.5	111.5 R12-NQ 5 ft 98%	92	1 1 2 1 0 NR/	110.4' - Bedding plane, <10 deg, smooth, undulating 110.85' - Mechanical break 112.35, 112.6' - Bedding plane (2), <10 deg, rough, undulating 114.0' - Fracture, 40 deg, smooth, undulating 114.35, 115.45' - Bedding plane (2), smooth, planar		30-70% coverage of <3/16" voids on surface variable and decreasing with depth, cavities up to 1/2" to 1/4", fossiliferous, fossil molds and casts  No Recovery 111.2-111.5' Limestone 111.5-116.4' - pale yellowish brown, (10YR 6/2), very fine to fine grained, extremely weak to weak (R0 to R2), 40-70% coverage of <1/16" voids on surface variable, fossiliferous with fossil molds and casts <1/4" diameter  No Recovery 116.4-116.5'	SC-3 collected at 115.45- 116.2' R12: 14 minutes
-			1	117.3' - Fracture, 70 deg, smooth, planar 117.55' - Fracture or mechanical break, 30 deg, rough, stepped			-



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723934.5 N, 457719.1 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 1.0	) ft bg:	s on 0	3/09/07 START : 3/6/2007 END : 3/9	9/2007	LOGGER : R. Bitely, L. Prochaski	a
≩ D ⊋	(%)			DISCONTINUITIES	၅၉	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-	R13-NQ 5 ft 98%	92	1	119.45, 119.7' - Fracture or mechanical		Limestone  116.5-117.5' - yellowish gray, (5Y 7/2), very fine to fine grained, very weak to weak (R1 to R2), 30-50%	-
120 -77.5 -	121.5		1	break (2), 50 deg and 80 deg, rough, undulating 119.6' - Fracture or mechanical break, 60 deg, rough, planar 120.95' - Fracture or mechanical break, <10		<ul> <li>coverage of &lt;1/16" voids on surface,</li> <li>1 cavity 1/2" diameter, fossiliferous (molds), trace organics</li> <li>117.5-121.4' - Same as 116.5-117.5' except 50-70% coverage of &lt;3/16"</li> </ul>	R13: 9 minutes
-			NR) 4 1	deg, rough, stepped 121.6, 121.65' - Bedding plane (2), <10 deg, smooth, stepped 122.0' - Mechanical break or fracture, <10 deg, rough, stepped 122.5' - Bedding plane, horizontal, smooth, undulating		voids on surface, 20% coverage of 1/4" to 1" cavities on surface, highly fossiliferous (molds) No Recovery 121.4-121.5' Limestone 121.5-125.4' - very pale orange, (10YR 8/2), very fine to fine grained,	
- 125 -82.5	R14-NQ 5 ft 90%	70	0 2	122.65' - Mechanical break or fracture, 50 deg, rough, undulating 123.65, 123.9' - Fracture or mechanical break (2), 45 deg and 80 deg, rough, undulating		strong HCl reaction, weak to very weak (R2 to R1), 50-70% coverage of <3/16" voids on surface, 10% coverage of 3/16" to 1/2" cavities on surface, highly fossiliferous (molds) 125.4-126.0' - Same as 121.5-125.4'	R14: 8 minutes
-	126.5		NR >10	125.7' - Bedding plane, horizontal, smooth, planar 125.9' - Bedding plane, horizontal, smooth, undulating 126.5-126.83' - Fracture zone, smooth,		<ul> <li>except thinly (1/16") laminated with pale yellowish brown, (10YR 6/2),</li> <li>very fine to fine grained, weak to</li> <li>medium strong (R2 to R3), organics, mild HCl reaction except for</li> </ul>	Sample can be crushed between fingers to silt size
- - - 130 -87.5	R15-NQ 5 ft 100%	42	3 >10 >10	undulating, multiple intersecting fractures, fragments up to 2" diameter 126.85' - Bedding plane, horizontal, smooth, undulating 127.15' - Bedding plane or mechanical break, rough, undulating 127.7, 127.8, 128.0' - Bedding plane (3), <10 deg, smooth, undulating 128.15' - Bedding plane or mechanical break, horizontal, rough, undulating		Ilaminations No Recovery 126.0-126.5' Limestone 126.5-131.5' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, extremely weak to weak (R0 to R2), friable, 20% coverage of <1/16" voids on surface, highly fossiliferous (casts and molds)	material (calcerous)  - R15: 5 minutes
-	131.5		>10 5	128.5, 128.75, 128.9, 129.0 - Bedding plane (4), horizontal, rough, undulating 129.15-129.35 - Fracture zone, rough, stepped 129.55-129.65 - Fracture zone, rough,		131.5-134.7' - very pale orange, (10YR 8/2), very fine to fine grained,	K 15. 5 minutes
- - -	R16-NQ 5 ft	84	3	stepped 130.2, 130.8' - Bedding plane (2), rough, undulating 131.0-131.5' - Fracture zone, rough, stepped to undulating 131.6' - Bedding plane or mechanical break,		extremely weak to very weak (R0 to R1), trace organics, fossiliferous (casts and molds), 60-90% coverage of <3/16" voids on surface, interbedded laminated bedding up to 1" thick with trace voids and fossils	SC-4 collected at 134.0-
- 135_ -92.5 - -	100% 136.5		2	rough, undulating, 1/2" open 132.2' - Bedding plane or mechanical break, smooth, planar		= 134.7-136.5' - Same as 131.5-134.7' except strong HCl reaction, 20-40% coverage of <1/16" voids on surface, trace fossil molds or casts, interbedded with highly fossiliferous	134.85' – R16: 7 minutes
-			0	133.2, 133.55' - Bedding plane (2), <10 deg, rough, undulating 134.85, 135.1' - Bedding plane (2), <10 deg, smooth, undulating		- lenses up to 1" thick - - -	
			0				



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723934.5 N, 457719.1 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 1.0	) ft bgs	s on 0	3/09/07 START: 3/6/2007 END: 3/	9/200	7 LOGGER : R. Bitely, L. Prochask	a
≥∩≘	(%)			DISCONTINUITIES	စ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE	E RU STH, OVEF	(%) <sub>Q</sub>	FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
E SEST	SORE	RQE	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3×ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	R17-NQ		шш	135.9, 135.95' - Fracture or mechanical	10)	Limestone	
_	5 ft	100	0	break (2), 60 deg, rough, undulating,	Ħ	<ul> <li>136.5-141.5' - very pale orange,</li> </ul>	-
-	100%			intersecting	世	(10YR 8/2), very fine to fine grained, extremely weak to weak (R0 to R2).	-
140 -97.5			1	139.65' - Bedding plane or mechanical break, smooth, undulating	╀	— <1/16" voids, highly fossiliferous	
-				Shootif, and dating		(molds), interbedded with horizontal laminations up to 1 1/2" thick which	R17: 11 minutes
_			1		仜	<ul> <li>are yellowish gray (5Y 7/6) and</li> </ul>	- Triminutes
_	141.5			141.1' - Mechanical break, rough, undulating	+	exhibit no fossils and few voids <1/16", large fossil cast 1" in	-
_			1		$\vdash$	udiameter at 141.1'	-
_				142.2' - Fracture or mechanical break, 20	Ħ	141.5-144.95' - yellowish gray to very pale orange, (5Y 7/2 to 10YR 8/2),	00.5 11
_			0	deg, rough, stepped, 1/2" open	世	<ul> <li>very fine grained, medium strong</li> </ul>	SC-5 collected at 142.5- 143.75' -
-	D40 110				$\vdash$	(R3), 40-50% coverage of voids on surface, solution cavities up to 1 1/2"	_
-	R18-NQ 5 ft	68	2	143.8' - Mechanical break	$oxed{\bot}$	<ul> <li>with secondary infill of fine grained</li> </ul>	_
_	88%			144.1, 144.3' - Mechanical break or fracture		limestone with voids over 80-90% of surface, all fossiliferous with multiple	_
145 -102.5			>10	(2), <10 deg, rough, undulating to stepped, 1/4" open —	t	casts in matrix and secondary infill,	
-102.5				144.6, 144.7, 144.9' - Mechanical break or fracture (3), horizontal, rough, undulating,	╁	organic staining occuring on fresh surface at 144.1-144.95'	
_			0	organic staining	Ė	_ 144.95-145.9' - yellowish gray to very	R18: 38 minutes
_	146.5		NR	144.9-144.95' - Fracture zone, smooth to rough, undulating to stepped, organic staining	Ľ	pale orange, (5Y 7/2 to 10YR 5/2), very fine to fine grained, medium	
_			3	145.6' - Mechanical break	₽	strong (R3), 20-40% coverage of	1/4" clay infill at 151.2'
_				146.9' - Mechanical break or bedding plane, <10 deg, smooth, undulating, 1/4" open	igapha	<1/16" voids on surface, trace fossils, no cavities	_
_			>10	147.0' - Mechanical break	ш	No Recovery 145.9-146.5'	_
_	546.110			147.2, 147.45, 147.65, 147.7, 147.8, 147.9, 148.15, 148.2, 148.3, 148.35, 148.5' -	上	Limestone - 146.5-151.4' - yellowish gray to light	_
_	R19-NQ 5 ft	60	1	Mechanical break or bedding plane (11), <10	┢┰	olive gray, (5Y 7/2 to 5Y 3/2), fine	_
_	98%			deg, smooth to rough, undulating 149.05' - Fracture, 40 deg, rough, undulating	F	grained, very weak to medium strong R1 to R3), 50-80% coverage of	_
150_ -107.5			0	— — — — — — — — — — — — — — — — — — —	F	<1/16" voids on surface, moderately	
-107.5					Ħ	fossiliferous, trace laminations, trace - mottling/potential secondary infilling	D10: 0 minutes
_			1		╀	on cavities <1 1/2"	R19: 8 minutes Stop drilling at 18:00 on -
-	151.5		NR/	151.2' - Clay seam, horizontal, 1/4" open,	F	No Recovery 151.4-151.5'	3/8/07
-			0	1/4" clay infill	口	Limestone	Resume drilling at 08:15 on -
-				152.45' - Mechanical break	仜	151.5-153.8' - pale yellowish brown, (10YR 6/2), very fine to fine grained,	Driller's Remark: Depth to
-			1	102.70 - Micchallical Dicar	$\vdash$	moderate HCl reaction, weak to	water before drilling at 1' below ground surface –
-	B00 NO			153.3' - Fracture or mechanical break,	F	medium strong (R2 to R3), 30-60% coverage of <3/16" voids on surface	
-	R20-NQ 5 ft	73	5	horizontal, smooth, undulating, 1/4" open 153.8' - Fracture or mechanical break,	Ħ	variable, fossiliferous, fossil molds	_
_	95%			horizontal, smooth, undulating	片	and casts up to 1/2" to 1/4" - 153.8-155.4' - pale yellowish brown	_
155 -112.5			>10	153.95-154.65' - Mechanical break 154.1, 154.15, 154.2, 154.3, 154.35' -	$\vdash$	to dark yellowish brown, (10YR 6/2 to	
-112.5				Bedding plane (5), <10 deg, smooth,	$oxed{\bot}$	10YR 4/2), very fine to fine grained, extremely weak to weak (R0 to R2),	_
-			0	undulating, <1/4" open 154.65' - Fracture or mechanical break, <10	口	poorly laminated bedding, highly	_
-	156.5		NR	deg, rough, undulating	士	fossiliferous, fossil molds and casts - <1/4", organics on laminar partings,	D20: 27 minutes
_			2	155.3-155.4' - Fracture zone, <10 deg, rough, stepped to undulating	$\vdash$	60% coverage of <3/16" voids on	R20: 27 minutes
_				156.1' - Mechanical break	F	surface, 20% coverage of <3/4" - cavities on surface, 1" carbonate	_
_			4	156.65' - Bedding plane or mechanical break, horizontal, smooth, undulating, 1/4" open	片	derived silt lens at 155.3-155.4'	_
			_		$\vdash$		
					1		
			i l		1		I



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-06	SHEET	9	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723934.5 N, 457719.1 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: B. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 1.0	) ft bg:	s on 0	3/09/07 START : 3/6/2007 END : 3/	9/200	007 LOGGER : R. Bitely, L. Prochaska
>00	(6			DISCONTINUITIES	ű	LITHOLOGY COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERAL OCY, TEXTLIPE SIZE AND DEPTH OF CASING,
A S S A T S	TH. YER	(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	۵ ا	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, WEATHERING, HARDNESS,
E E E	ORE	RQD(%)	ZAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥMB	AND ROCK MASS  CHARACTERISTICS  SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
			표교		Ś	
_	R21-NQ 5 ft	76	5	157.05' - Fracture or mechanical break, 30 deg, rough, stepped, 1/2" open, silt size infill	L	155.4-156.25' - Same as 151.5-153.8'
_	99%			158.0' - Bedding plane or mechanical break,	⊬	No Recovery 156.25-156.5'
160_			1	horizontal, rough, undulating, 1/4" open 158.25, 158.35, 158.45' - Fractures or —	口	Limestone — 156.5-157.8' - yellowish gray to pale — — — — — — — — — — — — — — — — — — —
-117.5			Ľ.	mechanical break (3), horizontal, smooth to	h	yellowish brown, (5Y 7/2 to 10YR
l _			0	rough, undulating, 1/4" open 158.6' - Bedding plane, rough, undulating,	┢	6/2), very fine to fine grained, SC-6 collected at 160.45-moderate HCl reaction, weak to 161.45'
	161.5		"	1/4" open	Ė	medium strong (R2 to R3), 40-70% R21: 27 minutes
				158.8, 158.83, 158.85, 158.9' - Bedding plane or mechanical break (4), smooth to rough,		coverage of <3/16" voids on surface, fossiliferous with molds and casts
				undulating, 1/4" open		157.8-159.0' - yellowish gray, (5Y
_				159.45' - Fracture, 60 deg, rough, undulating, 1/4" open	1	7/2), very fine grained, mild HCl reaction, medium strong (R3),
1 -				160.45' - Mechanical break	1	interbedded, 10-30% coverage of
1 -					1	<pre>&lt;1/16" voids on surface, few fossils - 159.0-161.4' - Same as 156.5-157.8'</pre>
1 -					1	No Recovery 161.4 - Same as 156.5-157.8
1 -					1	Bottom of Boring at 161.5 ft bgs on
1 -				_	1	— 3/9/2007
-				-	1	
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WATER LEVELS: 2.5 ft bgs on 03/07/07

16.0

18.0

20

1.1

1.7

SS-9

SS-10

14-14-3-2

(17)

2-3-6-3

(9)

PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-07	SHEET	1	OF	14	

#### **SOIL BORING LOG**

LOGGER: J. Schaeffer, R. Gomez

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724100.8 N, 457649.4 E (NAD83)

DRILLING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit

START: 2/25/2007

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

SOIL DESCRIPTION COMMENTS STANDARD Pog DEPTH BELOW SURFACE AND ELEVATION (ft) PENETRATION TEST RESULTS SAMPLE INTERVAL (ft) SYMBOLIC SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, RECOVERY (ft) MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND CONSISTENCY, SOIL STRUCTURE, MINERALOGY INSTRUMENTATION 6"-6"-6"-6" #TYPF (N) 42.3 0.0 Topsoil 0.0-0.1' - wood debris 1-2-2-1 Poorly Graded Sand (SP) SS-1 1.0 (4) 0.1-1.0' - pale yellowish brown, (10YR 6/2), moist, very loose, no HCl reaction, very fine to fine grained 20 silica sand to <1/16", trace nonplastic fines, trace NR=No Recovery organics 2.0-2.4' - Same as 0.1-1.0' except color darkens with 3-3-4-5 depth SS-2 1.4 (7) Poorly Graded Sand With Silt (SP-SM) 2.4-3.4' - dark yellowish orange, (10YR 6/6), moist, 4.0 loose, very fine to fine grained, nonplastic, no HCI reaction, 5-10% nonplastic fines, trace fine organics 2-2-50/5 and roots, mottled, sand is silica 1.0 SS-3 (52/11")Silty Sand (SM)  $37.\bar{3}$ 4.0-4.4' - moderate yellowish brown, (10YR 5/4), 5.4 moist, loose, very fine to fine grained, low plasticity, 6.0 no HCI reaction, 30% low plastic fines, trace organics, 50/5 0.4 SS-4 sand is silica 6.4 (50/5")Clayey Sand (SC) 4.4-4.7' - pale green, (10G 6/2), moist, loose, no HCl reaction, 20-25% medium to high plastic fines, trace organics at contact with next material 8.0 Silt With Sand (ML) 4.7-5.0' - yellowish gray, (5Y 8/1), moist, hard, nonplastic, very rapid dilatancy, moderate HCI Ш 45-3-2-1 0.8 SS-5 reaction, 15-20% sand-sized, very fine to fine and (5)scattered coarse-sized, all carbonate
Silt (ML) 10 10.0 6.0-6.4' - yellowish gray, (5Y 8/1), wet, hard, 32.3 nonplastic, very rapid dilatancy, moderate HCI reaction, some yellowish staining, 5-10% very fine to 2-1-2-4 fine sand-sized, trace coarse sand-sized, all 1.9 SS-6 (3) carbonate Sandy Silt And Limestone Fragments (ML) 12.0 8.0-8.5' - Same as 6.0-6.4' except some yellowish staining, 30-35% coarse sand to fine limestone 4-5-50/6 fragments sized carbonate material, has the 15 SS-7 (55/12")appearance of beds, may be extremely weak imestone 13.5 Silt (ML) 8.5-8.8' - Same as 6.0-6.4' 10.0-10.6' - Same as 6.0-6.4' except soft, 5-10% very 14.9 0.0 SS-8 50/2 (50/2")fine sand sized, all carbonate 15 Silt With Sand (ML)  $27.\bar{3}$ 10.6-11.9' - Same as 10.0-10.6' except 10-15% fine to medium sand sized, trace fine gravel sized carbonate

END: 3/8/2007

material, trace limestone lenses <1/2" thick

larger particles, all carbonate

No Recovery 14.0-14.2'

12.0-13.5' - yellowish gray, (5Y 8/1), wet, soft,

nonplastic, very rapid dilatancy, sand-sized content

varies, trace scattered fine gravel-sized, 1/6" thick

lenses of limestone from 13.4-13.6', moderate HCl reaction in fines, mild to moderate HCI reaction in

Driller's Remark: 16.0-18.0' is hard, cuttings

are brown limestone fragments

Driller's Remark: Softer at 18.0'



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-07	SHEET	2	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724100.8 N, 457649.4 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical

DRILLIN	G METH	OD AND	EQUIPM	ENT : CME 550X	S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 2.5 ft b	gs on 03/0	07/07	TART : 2/25/2007 END : 3/8/2007 LOGGER : J. Schaeffer, R. Gomez
[				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	AL (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
BEI CE.		RECOVI	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH SYA			#TYPE	6"-6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
				(N)	λs
22.3	20.0				
		1.0	00.44	1-2-27-50	
_		1.6	SS-11	(29)	reaction, 5-10% fine to coarse grained sand, all
-	22.0				carbonate     -\frac{11.1}{Sandy Silt (ML)}
_	22.0 22.2	0.2	SS-12		□ 18.0-19.7' - Same as 16.0-17.1' except 40% sand □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □
_				(50/2")	sized trace gravel sized to 1", voids 1/16" and fossil only soft at 23.6'
_					Silty Sand (SM)
-					20.0-21.6' - grayish orange, (10YR 7/4), wet, medium
-	24.0				dense, fine to coarse grained, moderate HCl reaction,
-		1.1	SS-13	9-26-50/2	\ <1/4" thick, all carbonate   / -
25 <u> </u>	25.2			(76/8")	22.0-22.2' - Same as 20.0-21.6' except silt and fine to coarse gravel sized limestone pieces
17.3					Silty Sand With Limestone Fragments (SM)   -
_	<u> 26</u> .9		L		24.0-25.1' - grayish orange, (10YR 7/4), wet, very
		0.1	SS-14	50/1 (50/1")	dense, fine to coarse grained, moderate to strong HCl still have no circulation; install 4" HW casing; heavy chatter at 15.0-20.0'
				(30/1)	to 1", trace white limestone fragments
					Silt (ML)   Resume drilling 2/26/07 at 8:00     Resume drilling 2/26/07 at 8:00
	28.0				and a 1" iron nodule, silt may be slough
_			00.45	6-50/5	Sandy Silt With Limestone Fragments (ML)
-	28.9	0.6	SS-15	(56/11")	28.0-28.6' - pale yellowish brown, (10YR 6/2), wet, very dense, fine to coarse grained, moderate to strong
-					HCl reaction, 16% nonplastic fines, limestone
	00.0				\fragments to 2"
30 12.3	30.0				Limestone Fragments
-					│ \ 30.0-30.1' - pale yellowish brown, (10YR 6/2), mild to │ - │ │ │ │ │ │ │
-		1.3	SS-16	3-7-13-6 (20)	moderate HCl reaction, coarse gravel-sized pieces,
-				(20)	very weak limestone
-	32.0				Silty Sand (SM)
-					30.1-31.3' - dark yellowish orange, (10YR 6/6), wet,
-		2.0	SS-17	2-3-3-4	├──\reaction, 35% nonplastic fines, all carbonate
_		'-		(6)	Silty Sand With Limestone (SM)  32.0-32.8' - Same as 30.1-31.3' except mild HCl
	34.0				□\reaction, intact limestone fragments to 1" in silt and  /□□□□
	34.6	0.4	SS-18	45-50/1 (95/7")	sand sized matrix
35				(30,1)	Sandy Silt (ML) 32.8-33.5' - dark yellowish orange, (10YR 6/6), wet,
7.3					very soft, moderate HCl reaction, 30-35% sand-sized
I -	36.0				fragments, very friable, trace medium sand-sized white particles, trace black streaks
-		0.0	SS-19		Silty Sand With Limestone (SM)
-				(50/0")	33.5-33.7' - Same as 32.0-32.8' Shut down at 10:11 2/26/07 due to hydraulic
-					33.7-34.0' - yellowish gray, (5Y 8/1), wet, medium dense, mild HCl reaction, intact limestone fragments
-	00.0				to 1" in silt and sand-sized matrix, fragments have
-	38:P	0.1	\ SS-20 /	50/1	many fossil molds/casts, all carbonate Resume drilling 2/27/07 12:00
-			, 33 20)	(50/1")	Sandy Silt (ML)  34.0-34.2' - Same as 32.8-33.5' except medium stiff  Driller's Remark: 38.0-40.0' hard, but no chatter
-				<b> </b>	Silty Sand (SM)
-					
40					No Recovery 36.0'
1			1	I	



PROJECT NUMBER:	BORING NUMBER:
338884.FL	A-07

SHEET 3 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724100.8 N, 457649.4 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical

DRILLIN	G METH	OD AND	EQUIPM	ENT : CME 550X	S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION : Vertical
WATER	LEVELS	: 2.5 ft bo	gs on 03/0	07/07	TART : 2/25/2007
				STANDARD	SOIL DESCRIPTION 0 COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
BEI GE.		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
PTH EVA			#TYPE	6"-6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
				(N)	S X
2.3	40.0				\\Limestone Fragments \\38.0-38.1' - dark yellowish brown, (10YR 4/2),
		1.9	SS-21	6-8-33-50/5	∖moderate HCl reaction, fragments <1/8" thick and
		1.5	33-21	(41)	wafer shaped, abundant fossil casts/molds
-	42:8				Silty Sand (SM)  40.0-41.9' - moderate yellowish brown to dark
-	72.0				yellowish brown, (10YR 5/4 to 10YR 4/2), wet, dense,
-		1.3	SS-22	21-38-50/5	\fine to coarse grained, moderate to strong HCl
-	43.4			(88/11")	thin bedded appearance at 41.6-41.9', sand-sized Driller's Remark: Chatter starting at 43.0'
-					│ │ │very friable and can crush with fingers, all carbonate
-	44.0				Sandy Silt (ML) 42.0-43.0' - moderate yellowish brown to dark
-					
45 -2.7		1.4	SS-23	14-15-17-24	plasticity, no dilatancy, strong HCl reaction, trace black streaks, 30% fine sand-sized
-2.1				(32)	Silty Sand With Limestone Fragments (SM)
	46.0		00.5		43.0-43.3' - moderate yellowish brown to dark
_	46.3	0.3	SS-24	50/4 (50/4") /	yellowish brown, (10YR 5/4 to 10YR 4/2), dense, moderate to strong HCl reaction, trace black streaks,
				(30/4)	predominately sand-sized material with 30% silt-sized,
					limestone fragments in last 0.3' with bedded
-	48.9				appearance, carbonate materials - Sandy Silt (ML)
-	48:4	0.1	SS-25	50/1	44.0-45.4' - moderate yellowish brown to dark
-				(50/1")	yellowish brown, (10YR 5/4 to 10YR 4/2), moist to wet, hard, nonplastic, low to rapid dilatancy, strong
-					HCl reaction, 40% fine sand, 1/2" limestone lens at
					44.2'   Silty Sand (SM)
50 -7.7	50.0				46.0-46.3' - moderate yellowish brown to dark
'					\∥yellowish brown, (10YR 5/4 to 10YR 4/2), wet, very
-		1.5	SS-26	46-31-49-41	dense, fine to coarse grained, strong HCl reaction, 40% medium plastic silt, last 0.1' has gravel-sized
_				(80)	∭limestone fragment
_	52.0				Limestone Fragments 48.0-48.1' - strong HCl reaction, 80% coverage of
				4-14-50/4	voids 1/16" or less on surface of fragments
		0.9	SS-27	(64/10")	Sandy Silt (ML)
	53.3				50.0-51.5' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), moist to
1 7	54.9				wet, hard, fine to coarse grained, moderate HCl
1 7	J <del>≒</del> . I	0.0	SS-28	50/1	reaction, 55% nonplastic fines, 3/4" to 1/2" limestone
55				(50/1")	Silty Sand (SM)
-12.7					52.0-52.9' - Same as 50.0-51.5' except 40-50% low plastic fines, 1/2" poorly indurated limestone lens at
-	EG 0				52.3'
-	56.9	0.1	SS-29	50/1	No Recovery 54.0-54.1' Driller's Remark: Very hard 56.0-57.0', softer
-				(50/1")	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
-					\moderate HCl reaction, fragments to 1", 60%   -
-					coverage of 1/16" voids on surface, black streaks
-	58.0				☐ Limestone Fragments
-		0.8	SS-30	25-50/6 (75/12")	\ 58.0-58.1' - moderate yellowish brown, (10YR 5/4),
-	59.0			(75/12")	¬∖ moderate HCl reaction, 60% coverage of 1/16" voids / ¬  □ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
					on surface, fossil molds/casts, black streaks, very Driller's Remark: Very hard 59.0-60.0'
60					
			1		<b>I I</b>



PROJECT NUMBER: BORING NUMBER: 338884.FL A-07

## **SOIL BORING LOG**

SHEET 4 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724100.8 N, 457649.4 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION : Vertical

	WATER LEVELS: 2.5 ft bgs on 03/07/07 START: 2/25/2007 END: 3/8/2007 LOGGER: J. Schaeffer, R. Gomez									
WATER	LEVELS	: 2.5 ft bo	as on 03/0		TART : 2/25/2007					
≥□₽				STANDARD PENETRATION	SOIL DESCRIPTION ON CONVINIENTS					
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION					
H BE ATIO		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND					
LEV.	"""				CONSISTENCY, SOIL STRUCTURE, MINERALOGY					
				(N)						
-17.7	60.0	0.9	SS-31	5-50/6	Silty Sand (SM)   58.1-58.8' - moderate yellowish brown, (10YR 5/4),   -					
	61.0	0.5	0001	(55/12")	wet, very dense, fine to coarse grained, moderate HCI					
					reaction, black streaks, 35-40% low plastic fines,					
	62.9				carbonate     -					
-	<del>82</del> :4	0.0	SS-32	50/1	── 60.0-60.9' - moderate yellowish brown, (10YR 5/4),					
-				(50/1")	wet, low to medium plasticity, rapid dilatancy, strong HCl reaction, hard, 15-20% fine sand-sized carbonate					
-					particles, trace black streaks, trace coarse sand-sized					
-					limestone fragments					
_	64.0				No Recovery 62.0-62.1'					
_		0.8	SS-33	44-50/3 (94/9")	Silty Sand (SM) 64.0-64.8' - Same as 58.1-58.5' except 50% silt sized					
65	64.8			(94/9 )	─∖ carbonate material, 2 limestone lenses 1" thick, last					
-22.7					0.2' is coarse sand size limestone fragments, no black					
	66.0				\streaks \ \ \ -					
-	00.0	0.0	SS-34	50/0	Limestone Fragments					
-				(50/0")	66.0' - moderate yellowish brown, (10YR 5/4), hard, very fine grained, mild to moderate HCl reaction,					
-					voids (1/16") over <5% of surface, few fragments   Driller's Remark: Gets softer at 67.0'					
-					recovered, fragments are 1/4" size					
_	68.0			47.50/0	Cillar Cond (CM)					
_	68.7	0.7	SS-35	17-50/2 (67/8")	Silty Sand (SM)					
_				(0110)	\pieces to 1/2" in size, 80% coverage of voids 1/16" on /					
70	70.0				Silt With Sand (ML) 68.4-68.7' - grayish orange, (10YR 7/4), moist, hard,					
-27.7	70.3	0.2	SS-36	50/4	-∖\low plasticity, rapid dilatancy, moderate HCl reaction,  /					
-				(50/4")	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					
-					70.0-70.2' - Same as 68.4-68.7' except 25%					
-					sand-sized Driller's Remark: Hard at 71.5'					
-	72.0				Sandy Silt With Limestone Fragments (ML)					
-		0.7	SS-37	14-9-50/5	72.0-72.7' - moderate yellowish brown, (10YR 5/4),					
-		0.7	55-37	(59/11")	wet, hard, mild to moderate HCl reaction, 68% fines,					
I _	73.4				\\\\2" lense of limestone, scattered pieces to 3/8", 80\% \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					
	74.0				Section 3 of the section of the sect					
]					Lean Clay (CL)					
75		1.8	SS-38	2-3-7-50/4	74.0-74.9' - pale yellowish brown, (10YR 6/2), moist, low to medium plasticity, no dilatancy, strong HCl					
-32.7		1.0	00-00	(10)	reaction, stiff, 10-15% fine to medium sand-sized Till Driller's Remark: Very hard at 75.0'					
-	<del>7</del> 5:8				\particles, trace black spots to 1/16", carbonate \frac{1}{1} Driller's Remark: Finish drilling at 18:10 on					
-	. 5.0	0.0	SS-39	50/0	Sandy Silt (ML)					
-				(50/0")	\[ 74.9-75.8' - yellowish gray, (5Y 8/1), moist to wet, stiff, \[ − \]					
-					low plasticity, slow to rapid dilatancy, strong HCl					
_					reaction, 20-30% sand-sized material, carbonate					
_					75.9-76.0' - dark yellowish brown, (10YR 7/2),					
					moderate HCl reaction, some with voids 1/16", others   -   without voids					
]					Begin Rock Coring at 76.0 ft bgs					
1 7					See the next sheet for the rock core log					
80					1					
50_					<del>-                                      </del>					



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-07

SHEET 5 OF 14

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724100.8 N, 457649.4 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 2.5	ft bgs	s on 0:	3/07/07 START : 2/25/2007 END : 3/	8/200	7 LOGGER : J. Schaeffer, R. Gome	ez
>00	(9			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_	76.0		4	76.2-76.3' - Mechanical break, multiple	Ħ	Limestone - 76.0-81.0' - pale yellowish brown to	Install HW casing to 76.0'  Not able to retrieve inner
-			3	76.7' - Fracture, smooth, undulating, <3/4" silt infilling or silt seams 77.2' - Fracture, horizontal, smooth, planar, <1-3/16", thick clayey silt		very pale orange, (10YR 6/2 to 10YR 8/2), strong HCl reaction, no noticeable fossils, no solution cavities from 76.0-79.0', 16%	core last interval due to catcher not grasping inner core barrel Begin rock coring at 76.0'
-	R1-HQ 5 ft 100%	73	1	77.4' - Fracture, horizontal, smooth, planar, <3/16" fines 77.9' - Fracture, horizontal, smooth, planar,		coverage of solution cavities 3/8" or less in diameter at 79.0-81.0', 1-2 perfect elongate spherical solution	After pulling core barrel, used A rods to flush hole with water to extract slough
80_			1	<3/8" silt 78.2' - Fracture, 1-2 deg, rough, stepped, <3/4" friable fines	H	cavities, limestone is fine grained at 76.0-76.9' and 79.2-81.0' (very pale orange), limestone becomes silty	-
-37. <del>7</del> -	81.0		1	79.2' - Fracture, rough, stepped, <3/16" fines 80.3' - Fracture, 30-40 deg, rough, stepped, <3/16" fines		from 77.2-77.9' - -	R1: 12 minutes  SC-1 collected at 80.0- 81.0'
-			1	81.6' - Fracture, 1 deg, smooth, undulating, <5% fines, laminated organics		81.0-81.3' - very pale orange, (10YR 8/2), strong HCl reaction, fine grained limitione, no fossils, no	-
-	D2 LIO		2	82.3' - Fracture, 20-25 deg, rough, stepped, 20-30% mix of fines and sand sized grains 82.9, 83.5' - Fracture (2), horizontal and 5-10	F	solution cavities  81.3-86.0' - pale yellowish brown, (10YR 6/2), moderate to strong HCI reaction, 20-30% microfossils.	-
-	R2-HQ 5 ft 100%	92	1	deg, rough, stepped, 20-30% mix of fines and sand sized grains		- 50-70% silty matrix, 60-70% coverage of solution cavities 1/16" or less. 81.5-81.6' zone laminated	SC-2 collected at 83.7-
85 -42.7			1	84.8' - Fracture, rough, undulating, 20-30% — mix of fines and sand size grains	Ė	usky brown (5YR 2/2) organics	84.7' - R2: 8 minutes
-	86.0		0	THIN OF HIES AND SAID SIZE GLAITS	Ħ	- 86.0-88.0' - moderate yellowish	1
_			1	86.4' - Fracture, 30 deg, sand to gravel size limestone grains		<ul> <li>brown, (10YR 5/4), 30-50% fossil shells, molds and casts, 50-60% coverage of 3/8" or less solution</li> </ul>	-
_	R3-HQ	•	1	87.6' - Fracture, 25 deg, rough, stepped, <3/4" fractured carbonate grains and up to 1-3/16" void filled with fat clay (CH)		<ul> <li>cavities, 87.6' infilling of fat clay (CH)</li> <li>bluish gray (5B 9/1) to light bluish</li> <li>gray (5B 7/1), high plasticity and very</li> </ul>	-
_	5 ft 100%	93	0	88.4' - Fracture, horizontal, smooth, undulating, <3/8" silty infilling		moist 88.0-88.4' - pinkish gray, (5YR 8/1), dry, dense, strong HCl reaction, extremely weak to very weak (R0 to	]
90 -47.7			1		Ħ	R1)  88.4-90.6' - pinkish gray, (5YR 8/1), dry, dense, strong HCl reaction, very	SC-3 collected at 89.6- 90.6' R3: 11 minutes
_	91.0		0	90.6' - Bedding plane, horizontal, smooth, undulating	Ē	weak (R1) 90.6-91.0' - pinkish gray, (5YR 8/1), strong HCl reaction, 70-90% silty	]
-			2	92.5' - Fracture, horizontal, smooth, planar	Ë	matrix, no fossils observed 91.0-94.0' - Same as 90.6-91.0' - except weak to medium strong (R2 to R3), noticeable fossil (shell	SC-4 collected at 91.7- 92.6'
_	R4-HQ 5 ft 100%	70	<7	92.8' - Fracture, horizontal, rough, undulating, infilled with 3/4" of medium plasticity clay/silt 93.3-93.7' - Fracture zone, rough, undulating,	Ė	fragments, casts), 10-20% coverage of voids 1/8" or less	-
95	100 70		0	multiple fractures, low to high angle		94.0-96.0' - moderate yellowish - brown, (10YR 5/4), 30-50% fossil shells, molds and casts, 50-60%	-
-52. <del>7</del> -	96.0		1			coverage of solution cavities up to 3/8"	R4: 12 minutes  Driller's Remark: 95.0-96.0'  soft



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≥0.0	(9)			DISCONTINUITIES	Õ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ATIC ATIC	E RU STH, OVEF	(%) <sub>Q</sub>	TUF FOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURF ELEV	SORI	RO	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	011			95.4' - Fracture, planar, <2" thick, clays and		Limestone	
-			>10	silts 96.0-98.0' - Fracture zone, 0-90 deg,	╁╴	<ul> <li>96.0-97.0' - pinkish gray, (5YR 8/1), strong HCl reaction, 70-90% silty</li> </ul>	-
-				fractured material, most likely mechanical	F	matrix, non fossiliferous	Driller's Remark: Sand
-				breaks	Ħ	- No Recovery 97.0-100.0'	lense 97.0-100.0'; core loss - assumed to be from that
-	R5-HQ				Ħ	-	interval
	5 ft 40%	0	NR		Ħ		No recovery in core barrel – but residual material
							appears to be very fine to fine grained sand, poorly
100				_	oxdot		graded, white to light brown
-57. <del>7</del>			>10		₽	Limestone - 100.0-101.0' - medium yellowish	in color Driller's Remark: Advance –
_	101.0			,	₽	brown, (10YR 5/4), strong HCl	HW casing past sand lense to 101.0'
-			1			reaction, very weak (R1), 30-50% fossils shells, molds and casts,	R5: 13 minutes –
-				101.6' - Mechanical break, horizontal, rough, stepped, 3/4" of relief, open	I	50-60% solution cavities 101.0-105.3' - Same as 100.0-101.0'	Insert and set surface casing to 101.0'
-			0	otoppou, or it of tollow, opon	士	<ul> <li>except solution cavities up to 3/4" in</li> </ul>	Stop drilling at 17:30
-	R6-HQ			士	length (fossil molds)	2/28/07 Resume drilling at 15:52	
-	5 ft	86	0			-	3/6/07 _ SC-5 collected at 102.4-
-	86%				╁	-	103.4'
105			0		$\vdash$	-	-
-62.7			0	_	Ħ	<u>-</u>	R6: 8 minutes
-	106.0		NR	-	Ħ	No Recovery 105.3-106.0'	-
-			0		Ħ		_
			U		Ħ	106.0-111.0' - very pale orange, (10YR 8/2), strong HCl reaction,	]
_			1		H	weak to medium strong (R2 to R3), 20-40% coverage of solution cavities	_
_			· ·	107.5' - Mechanical break, 2-6 deg, rough, planar	H	up to 3/16", no apparent bedding,	SC-6 collected at 107.9-
-	R7-HQ 5 ft	100	100 0	pura	₽	hammer, 10-20% fossil evidence	108.9'
-	100%						_ Driller's Remark: Softer
-			0			_	drilling 109.0-111.0'
110 -67.7				_	╆	_	R7: 14 minutes
-			0		士	-	-
-	111.0				士	111.0-116.0' - Same as 106.0-111.0'	Very weak to weak interval
-			0			except Very weak to weak (R1 to R2)	identified as 109.0-111.0' – on field log, it is assumed
-						_ 4. 117.0-110.0	that 114.0-116.0' was
-			0			<del> -</del>	intended –
_	R8-HQ				Ħ	<u>-</u>	1
-	5 ft 100%	100	0		];		SC-7 collected at 113.7-
] _			0		片	_	114.6'
115			J	_	片	_	
-72. <del>7</del> -			0			-	R8: 7 minutes
	116.0				⊭		



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CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS: 2.5	ft bgs	s on 03	3/07/07 START : 2/25/2007 END : 3/	8/200	7 LOGGER : J. Schaeffer, R. Gome	ez
≥∩≘	(%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE ATIC	R. H.	(%) Q	T.0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	l l	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT URF LEV	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	038	ď	ᇤᇟ	THICKNESS, SURFACE STAINING, AND HIGHTNESS	Ś		
_			0		ш	Limestone 116.0-121.0' - very pale orange,	_
_					ш	(10YR 8/2), 60-80% coverage of	_
			0		ш	broken shells, fossil molds and casts, 20-30% coverage of 3/4" diameter	
						solution cavities from 116.0-117.5',	
	R9-HQ 5 ft	100	1	118.3, 119.5, 120.8' - Fractures (3),	Ы	20-40% silty and sandy matrix, black and translucent crystals very fine to	SC-8 collected at 118.2-
	100%	100	'	horizontal, rough, stepped	Ш	fine grained, not the typical moderate	119.2'
			4		Ш	yellowish brown fossiliferous limestone encountered towards	1
120			1		Ш	upper portion	1
-77.7				_	ш		R9: 9 minutes
_	121.0		1		Ш	_	1
_	121.0			121.2, 121.6' - Mechanical break (2)	Н	121.0-123.4' - light olive gray, (5GY	1
-			2	121.2, 121.6 - Wechanical break (2)	ш	<ul> <li>6/1), very fine to fine grained, strong</li> <li>HCl reaction, 30% coverage of 1/6"</li> </ul>	1
-					Н	to 3/16" voids, 5% coverage of	1
-			0		ш	<ul> <li>cavities 1/4" or less are dissolved fossils, fossiliferous</li> </ul>	1
_	R10-HQ				ш	_ lossiis, lossiilerous	SC-9 collected at 124.8-
-	5 ft	96	2	123.4' - Fracture, smooth, undulating,	Ш	123.4-126.0' - yellowish gray, (5Y	125.8'
_	100%			limestone contact 123.5' - Fracture, 60 deg	+	<ul> <li>8/1), very fine grained, strong HCl reaction, 15% coverage of voids</li> </ul>	-
-			1	124.3' - Fracture, 1-2 deg, smooth,	ш	1/16" or less, laminated bedding of	-
125 <u> </u>				undulating	₽	light silts as well as undulating	R10: 13 minutes
-02.7			1	124.6' - Fracture, 75 deg, rough, stepped, tight	ш	laminae from 124.0-125.5'	Stop drilling at 17:58 3/6/07
_	126.0			125.8' - Fracture, 0-1 deg, rough, undulating	ш	126 0 127 7! polo vollovijeh brown	
_			0		Н	126.0-127.7' - pale yellowish brown, - (10YR 6/2), strong HCl reaction,	D
_					$\vdash$	10-20% coverage of fossil shells and	Resume drilling at 08:03
_			0		П	casts, no solution cavities, 10-30% coverage of voids 1/6" or less,	_
_					Ш	50-60% sand-sized matrix with black	_
	R11-HQ 5 ft	88	0		ш	grains 1/16" or less 127.7-129.8' - very pale orange,	
	100%	00	U		ш	(10YR 8/2), strong HCl reaction, very	
			3	129.1, 129.5' - Fractures (2), 5 deg, rough,	Н	weak to weak (R1 to R2), 30-40% coverage of 3/8" or less solution	
130			3	planar		cavities	1
-87.7			_	129.9, 130.1' - Fractures (2), 5 deg, smooth, — planar	Ш	129.8-130.1' - pale yellowish brown, (10YR 6/2), fine grained, medium	R11: 7 minutes SC-10 collected at 130.0-
	131.0		1	plants.	Ш	strong (R3), no fossils	131.0'
				131.2' - Bedding plane, horizontal, smooth,	$\mathbb{H}$	130.1-131.0' - Same as 127.7-129.8' 131.0-132.8' - very pale orange to	1
]			2	planar	Ш	pale yellowish orange, (10YR 8/2 to	1
				131.99' - Fracture, rough, stepped	Ш	10YR 8/6), strong HCl reaction, extremely weak to very weak (R0 to	1
-			3	132.4, 132.5, 132.7' - Fractures (3), 7-20 deg,	$\mathbb{H}$	R1), medium to coarse quartz grains	
-	R12-HQ			rough, stepped, irregular, minor silt infilling, open to 1/4"	Ħ	and sand-sized carbonate grains,	SC-11 collected at 132.8- 133.8'
-	5 ft 100%	80	0		Ħ	_ 30-40% fossils, 20-40% coverage of 1/16" or less voids	
-	100 /0			124.21 Machanical brook rough stonged	₩	132.8-134.4' - very pale orange.	
105			1	134.2' - Mechanical break, rough, stepped	囯	_ (10YR 8/2), strong HCl reaction, very weak (R1), 10-20% fossils, voids	-
135_ -92.7					団	(<1/16") over 10-20% of surface	R12: 17 minutes —
-	400.0		3	deg, smooth, planar	H	<u></u>	
	136.0				Ħ		



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# **ROCK CORE LOG**

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ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 2.5	ft bgs	s on 0	3/07/07 START : 2/25/2007 END : 3/8	3/200	7 LOGGER : J. Schaeffer, R. Gom	ez
≥0.0	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q D	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	0.1%	<u> </u>	0	-	S	Limestone  134.4-135.5' - pale yellowish brown, (10YR 6/2), very fine grained, strong HCl reaction, laminar bedding, 5-6	-
-	R13-HQ		2	137.5, 137.8' - Fractures (2), horizontal, smooth, planar, silty infilling <1/16"		3/8" in diameter solution cavities following silty laminae, <10% coverage of voids 1/16" or less on	SC-12 collected at 137.8- 138.7'
_	5 ft 82%	62	0	_		surface 135.5-137.5' - grayish orange pink, (10R 8/2), weak to medium strong (R2 to R3), fine grained with some	-
140 -97.7			O NR			medium to coarse sand-sized particles, sporadic 1/16" pyrite grains, 10-15% coverage of 1/16" or	Driller's Remark: Circulation lost at 139.5' R13: 13 minutes
-	141.0		1	- 444.01 Freehung 40.45 des revenh		less voids	-
_ _ _	5		3	141.8' - Fracture, 12-15 deg, rough, undulating, open up to 1/4", minor silt sized particle infilling 142.2, 142.3, 142.7' - Fractures (3), 5-10 deg,		Limestone 137.8-139.5' - pale orange, (10YR 8/2), weak to medium strong (R2 to	- - Driller's Remark:
_	R14-HC 5 ft 100%	52	>10	rough, planar, apparent orientation of fractures with solution cavities 142.8-143.8' - Fracture zone, variable orientation, fragments range from 1/2" to 2		R3), 10-25% voids coverage of 1/16" or less, 10-20% fossils, 3/4" solution cavity with fat clay infilling at 139.5' 139.5-140.1' - grayish orange, (10YR	Continuous circulation loss - even while adding water to _ mud tub
145 -102.7			>10	1/2" 143.9' - Bedding plane, horizontal, smooth, — planar		<ul> <li>7/4), fine grained, weak to medium strong (R2 to R3), 10-20% fossil casts</li> <li>No Recovery 140.1-141.0'</li> </ul>	R14: 11 minutes
-	146.0		0	144.2, 144.6' - Bedding plane (2), horizontal, smooth, planar 144.6-146.0' - Fracture zone, fragments range from 1/2" to 3"x1" or larger		Limestone 141.0-144.0' - pale brown, (5YR 5/2), very weak to weak (R1 to R2),	SC-13 collected at 146.0- 147.05'
-			0	- - 147.6, 155.7' - Mechanical break (2), load		20-30% coverage of 3/4" voids on surface, intact fossil casts and molds, no broken fossil shells, becomes more fossiliferous towards	-
-	R15-HC 5 ft 100%	98	0	tests and machine breaks		base (143.5-144.0') and increases in sand-sized grains, dense limestone but density decreases 143.2-144.0'	
150_ -107.7			3	149.5, 149.6' - Bedding plane (2), 5-8 deg, rough, planar, <1/16" thick silty infilling on		as granularity increases  144.0-145.5' - pale yellowish brown, (10YR 6/2), very fine to fine grained, no visible fossils, laminar to thin	R15: 9 minutes
-	151.0		0	bedding plane partings 149.75' - Fracture, 80 deg, smooth, planar, tight		<ul> <li>bedded, 5-10% coverage of voids 1/16" or less</li> <li>145.5-146.0' - pale brown, (5YR 5/2), strong HCl reaction, weak (R2),</li> </ul>	SC-14 collected at 151.0-
-			2	- 152.1, 152.5' - Fractures (2), horizontal, rough, planar, <3/8" thick unconsolidated silt		10-30% sand-sized grain matrix 146.0-146.7' - very pale orange to grayish orange, (10YR 5/2 to 10YR	152.1'
-	R16-HQ 5 ft 100%	100	1	153.1' - Bedding plane, planar, undulating		7/4), medium to coarse grained, weak to medium strong (R2 to R3), fossils up to 3/8", sand to gravel-sized grains	-
155_	.5570		0	- - -		146.7-147.0' - fine grained, strong HCl reaction, weak (R2), silty laminae, silty matrix, no fossils, 15% coverage of voids 1/16" or less	
-112.7	156.0		1	155.2' - Fracture, rough, stepped, <1/16" silty infill		-	R16: 14 minutes



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≥∩≎	(%)			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
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- - - -	R17-HQ 5 ft 100%	100	0 1 0	157.5, 160.4' - Fractures (2), 0-5 deg, smooth, undulating		Limestone  147.0-149.7' - grayish orange to very pale orange, (10YR 7/4 to 10YR 5/2), mottled and variegated, fine to medium grained, strong HCl reaction, 10-20% 1/16" or less voids, sporadic echinoderms 3/8" to 9/16" - 149.7-151.0' - fine grained, weak to medium strong (R2 to R3), 5-10%	SC-15 collected at 157.5- 158.4' -
- 160 -117.7 -	161.0		0	- - -		fossil casts, 5-10% coverage of 1/8" or less voids 151.0-151.8' - Same as 149.7-151.0' except very fine to fine grained 151.8-152.4' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, very weak to weak (R1 to	R17: 9 minutes
- - - - -	R18-HQ 5 ft 100%	86	0 0 0	- - - - -		<ul> <li>R2), 10-20% coverage of voids 1/16" or less, silty matrix</li> <li>152.4-153.1' - brown, (10YR 5/4), alternating silt and sand-sized carbonate layers at less than 1/8" thick, 5-10% coverage of 1/8" or less solution cavities, fossil molds at base, undulant to broadly undulant, thin to laminar bedding, unit exhibits slow but moderate HCl reaction,</li> </ul>	SC-16 collected at 162.5- 163.4' -
165_ -122.7 -	166.0		3	164.7' - Fracture, horizontal, smooth, planar, minor silt infilling 165.3' - Fracture, horizontal, stepped, 1/8" relief, lithology contact, silt and sandy infill, <3/8" thick		strong HCl reaction in very fine grained layers, exhibits differential compaction in very fine grained layers, dissolved fossils at/near center of bedding features 153.1-155.0' - Same as 149.7-151.0'	Driller's remark: Feels - gritty like sand _
-	R19-HQ 5 ft	90	rough, planar, very fine to fine sandy infill, <3/8" thick	166.1-166.4' - Bedding plane, 0-5 deg, rough, -		except very fine to medium grained 155.0-156.6' - moderate orange pink to pale yellowish brown, (5YR 8/4 to 10YR 6/2), very weak to weak (R1 to R2), voids 3/8" or less, 10-20% fossils (30% at 155.3')	- - - -
- 170_ -127.7	100%	90	0	168.9' - Bedding plane, horizontal, smooth, stepped, consolidated silt/clay laminae, <3/16" thick  170.15' - Bedding plane, horizontal, rough,		156.6-161.0' - very pale orange, (10YR 8/2), strong HCl reaction, very weak to weak (R1 to R2), 30-50% coverage of voids 1/8" or less, 1-3% coverage of 3/8" or less solution cavities at base (161.0'), 15-20% silty	A variety of rock, mainly limestone and shell - fragments up to 1/4" x 1.3" in random distribution but sub parallel in deposition, the long axes are aligned
	171.0		2	stepped, <3/16" thick  171.2, 171.9' - Mechanical break or bedding plane (2), 0-3 deg, planar, rough to smooth		matrix 161.0-165.3' - Same as 156.6-161.0' except very thin laminar bedding planes from 163.6-164.9', brown laminae increase in frequency from	with apparent flow, the high energy (relatively) - deposition is from 167.2-168.25', where the bedding becomes laminar to thin
- -	R20-HQ 5 ft 100%	68	0	172.1' - Fracture, horizontal, smooth, undulating, silty infill <1/8" thick 172.2' - Fracture, horizontal, smooth, planar 172.5, 172.8' - Fractures (2), 10-15 deg, rough, planar		164.4-164.9' 165.3-165.6' - fine to medium grained, moderate HCl reaction, very fine to fine grained laminae 165.6-166.0' - medium gray, (N5), medium to coarse grained, strong	with very fine to fine grained laminae R19: 12 minutes SC-17 collected at 170.15- 171.0' SC-18 collected at 172.7-
- 175 -132.7	176.0		2	174.1' - Fracture, 5 deg, rough, stepped 174.6' - Fracture, 12 deg, rough, planar 175.1' - Fracture, 1-2 deg, rough, planar, <1/8" thick silty infill		HCl reaction, weak to medium strong (R2 to R3), no visible fossils, no solution cavities	174.0' - R20: 8 minutes -
	170.0						-



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724100.8 N, 457649.4 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS: 2.5	ft bg	s on 03	8/07/07 START : 2/25/2007 EN	D: 3/8/2007	LOGGER : J. Schaeffer, R. Gome	ez
≥D≎	. (%			DISCONTINUITIES	ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTN		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - - - - - - - - - - - - - - - -	R21-HQ 5 ft 100%	53	5 2 2 1 3	175.4-175.5' - Bedding plane, 0-3 deg, smooth, planar, 1/4" to 1/2" wafers 176.1-176.3' - Bedding plane, 0-3 deg, roug planar, recrystallized carbonate on plane 176.8' - Fracture, horizontal, rough, stepped enlarged solution cavity fractures at depositional contact 177.45' - Fracture, horizontal, smooth, planar, very fine grain infilling 177.95, 178.3, 178.5' - Fractures (3), horizontal, rough, planar, lithology contact, <1/16" thick very fine sandy infill 180.1, 180.4, 180.6' - Fractures (3), horizontal, rough, planar, <1/8" thick carbonate recrystallization infilling	d,	Limestone  - 166.0-167.5' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, sandy and silty sized matrix, fossil casts at base, 10-20% voids 3/16" or less, iron oxide stains and grains of pyrite  - 167.5-168.5' - grayish orange, (10YR 7/4), strong HCl reaction, 20-40% fossils, 20-40% coverage of solution - cavities 3/8" or less, 20-30% coverage of voids 1/16" or less  - 168.5-169.8' - alternating very pale orange and pale yellowish brown, (10YR 8/2 to 10YR 6/2), thinly laminated bedding	SC-19 collected at 178.95- 180.0' R21: 10 minutes
- - - - 185 -142.7	R22-HQ 5 ft 100%	45	4 0 2 4 5	181.1' - Fracture, horizontal, smooth, planal 181.5, 181.7, 181.7' - Fractures (3), horizontal, planar, smooth to rough, trace infilling  183.2' - Fracture, horizontal, rough, planar, trace silty infilling 183.5, 185.3, 185.4, 185.7, 185.8, 185.9' - Bedding plane (6), 5 deg 184.2, 184.5' - Fractures (2), horizontal, rough, undulating		169.8-171.0' - strong HCl reaction, very weak to weak (R1 to R2), no laminae, no visible fossils, 40-50% coverage of voids 1/16" or less 171.0-172.2' - grayish orange, (10YR 7/4), moderate HCl reaction, 1 solution cavity up to 3/8" wide and 1 3/16" long across surface, increase in silts below 172.0', becoming dark yellowish orange, voids 5/16" or less 172.2-172.5' - grayish orange, (10YR 7/4), very fine to fine grained, carbonate derived silt-sized particles 172.5-175.0' - Same as 171.0-172.2'	SC-20 collected at 181.8- 182.95'
	R23-HQ 5 ft 100%	66	5 1 2 1	186.1-186.3' - Fracture zone, horizontal, smooth, planar 186.6' - Fracture, horizontal, rough, planar, lithology contact 186.9' - Fracture, 10 deg, rough, undulating 187.8' - Fracture, 8 deg, rough, undulating, silty infilling from formation matrix 188.3, 188.7, 189.9' - Fractures (3), horizontal, rough, planar, trace silty infilling 190.5, 190.7, 190.9' - Fractures (3), 5-40 de trace silty infilling		- 175.0-175.5' - Same as 171.0-172.2' except fine grained, mild HCl reaction, laminated - 175.5-176.0' - pale yellowish brown, (10YR 6/2), strong HCl reaction, weak to medium strong (R2 to R3), - <2% coverage of voids 1/16" or less, no visible fossils 176.0-176.9' - fine grained, strong HCl reaction, weak to medium strong (R2 to R3), silty matrix with very fine sand (<10%), very fine to medium sand-sized lense, void filling with mica mineral, 10-15% coverage of tubular solution cavities on surface - 176.9-177.6' - pale yellowish brown,	SC-21 collected at 188.6- 189.8'
- - - - - 195 -152.7	R24-HQ 5 ft 100% 100%	13	>10 >10 >10 >10 >10	191.0-192.4' - Bedding plane, 0-10 deg, smooth, planar to undulating, numerous partings, irregular  192.4-195.05' - Fracture zone, 0-90 deg, rough, multiple fracture zones, irregular, ma exhibit recrystallization on the surface  195.05, 195.2' - Fractures (2), horizontal an 7 deg, smooth, planar		(10YR 6/2), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), <10% noticeable fossils, <10% coverage of voids 1/16" or less 177.6-181.0' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, very weak to weak (R1 to R2), silty matrix, 5-10% coverage of 3/8" or less solution cavities 181.0-183.5' - Same as 177.6-181.0' except dark brown silty organic laminae (1-3/16" thick)	Numerous rock fragments indicate possible cavity filling debris from at least 195.5-196.0' but probably 193.4-196.0' R24: 6 minutes



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724100.8 N, 457649.4 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DESCRIPTION   19   1	WATER	LEVELS : 2.5	ft bgs	s on 03	3/07/07 START : 2/25/2007 END : 3	/8/200	7 LOGGER: J. Schaeffer, R. Gome	ez
198.6   198.	<b>₹</b> □₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
198.6   198.	ELO E AN ON (f	JN, AND RY (9	(	RES	DESCRIPTION			
198.6   198.	TH B FAC	E RU STH OVE	%) Q	FOC	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOL	WEATHERING, HARDNESS,	
198.6   198.	DEP SUR ELE	COR LEN	RQ	FRA( PER		SYM		
196.0-196.3 - Fracture zone, random contentations, fragments 1/4" to 34" 196 is - Fractures (2), nonzontal, 196 is - Fractures (2), nonzontal, 196 is - Fractures (2), nonzontal, 196 is - Fractures (3), nonzontal, 196 is - Fractures (3), nonzontal, 196 is - Fracture, nonzontal, 196 is - Fractures (3), nonzontal, 196 is - Fracture, nonzontal, 196 is - Fractures (3), nonzontal, 196 is - Fracture, nonzontal, 196 is - Fracture, nonzontal, 196 is - Fracture zone, orientation and random, rock fragments range from 1/8 x1/2"   190 - 1995 - Fracture zone, orientation and random, rock fragments range from 1/8 x1/2"   190 - 1995 - Fracture zone, contentation and rock is - 190 - 1995 - Fracture zone, contentation and rock is - 190 -						世		
orientations, fragments 14" to 34"  4 orientations, fragments 14" to 34"  10 fb6. F-fracture, 92.05 deg, rough, planar 1973. 1974. F-fractures (2), horizontal, rough, planar 1973. 1974. F-fractures (2), horizontal, rough, planar 1986. F-fracture, planar, claim 1980. F-fractures (4), 07-deg, smooth, planar 1980. F-fracture zone, orientations are random, rook fragments range from 1/6"x1/2" to 180. F-fracture zone, orientations are random, rook fragments range from 1/6"x1/2" to 180. F-fracture zone, orientations are random, rook fragments range from 1/6"x1/2" to 180. F-fracture zone, orientations are random, rook fragments range from 1/6"x1/2" to 180. F-fracture zone, orientations are random, rook fragments degree of voids 1/16" or less, 180. F-fracture zone, random 201.5-202.1" F-fracture zone, planar inhology contact 100. F-fracture zone, multiple fracture inentiation 201. F-gracture zone, planar 200. F-fracture zone, pl	_			5		世		1
197.3   197.4   Fractures (2), horizontal, couple, planar, solution cavity fractures (3), britantials (3), and the properties (4), couple, planar, solution cavity fractures (4), couple, planar, solution (4), couple, planar, solution (4), couple, planar, solution (4), couple, planar, solution (5), couple, planar, solution, solution, solution, planar, solution, solution, solution, solution, solution, solution, solution, planar, solution,	_				orientations, fragments 1/4" to 3/4"	1	weak to weak (R1 to R2), 40-50%	1
R25-HO	_			4	196.6' - Fracture, 30-50 deg, rough, planar	茾		1
0.7 deg, smooth, planar   198.6 - Fracture, horizontal, smooth, planar, lithology contact   199.0-199.5 - Fracture zone, orientations are random, nock fragments range from 1/6"x1/2"   201.0 271'x1 11'2"   201.0 271'x1 11'x1 11'2"   201.0 271'x1 11'x1 11	_	R25-HQ			rough, planar, solution cavity fractures		1/16" or less	1
10   198.6° - Fracture, horizontal, smooth, planar, lithology contact rago - 199.0° - Fracture zone, orientations are random, rook fragments range from 1/6"x1/2"   10   210   201.0° - 15° - Fracture zone, random contentation orientation orienta	_		10	5	198.05, 198.1, 198.4, 198.5' - Fractures (4),	╁		1
Ithology contact   199.0-199.5 - Fracture zone, orientations are random, rock fragments range from 1/8"x1/2"   190.0-199.5 - Fracture zone, random orientation   1/8"x1/2"   1/8"   1/	_	7070		>10	198.6' - Fracture, horizontal, smooth, planar,			1
1-157.7  201.0  NR  random, rock fragments range from 1/8"x1/2"  201.0-201.5" Fracture zone, random one indiation 201.5-202.1" Fracture zone, 25-90 deg. rough, non separated fracture, indistinctly extends into underlangin guild extends into underlanging guild extends grain underlanging guild extends grain underlanging guild extends into underlanging guild extends into underlanging guild extends grain underlanging guild ex	200				lithology contact	士		1
201.0 201.0-21.5° - Fracture zone, random onentation 201.5-202.1°. Fracture zone, 25-90 deg, rough, non separated fracture, indistinctly extends into underlaying unit 201.5° - Fracture zone, 25-90 deg, rough, non separated fracture, indistinctly extends into underlaying unit 201.5° - Fracture, 10 deg, rough, planar 202.1° - Fracture, 201.5° - Fracture zone, multiple fracture, 10 deg, rough, planar 202.1° - Fracture zone, multiple fractures in the part of the				NR		╁╌		R25: 9 minutes
201.0-201.5 - Fracture zone, random orientation 201.5-202.1 - Fracture zone, 25-90 deg, rough, non separated fracture, indistinctly extends into undertaying unit 201.5 - Fracture zone, gund planar 202.1 - Fracture zone, multiple fracture orientation 203.7 - Fracture zone, multiple fracture source, 26.8 of control and practice produced provides 10 fracture zone zone, 75-80 deg, multiple fracture zone, 75-80 deg, multiple zone zone zone zone zone zone zone zon	-			1411	to 2"x1"x1 1/2"	<b>F</b>		
Section   Sect	-	201.0			201.0-201.5' - Fracture zone. random	岸	5-10% coverage of solution cavities	Widely disseminated -
The unit appears as random clast orientations in variety and pale yellow brown the pale or pale or pale or pale yellow brown to thin bedded, 10-20% coverage of solution cavities 3/6" or less. 192.4-193.4" - very pale orange, (10YR R/2), strong HCI reaction, very weak to weak (R1 to R2), 20-30% coverage of voilds 1/16" or less, 20-40% fossil casts and moids 193.4-196.0" pale yellowish brown, (10YR R/2), very fine to coarse grained, strong HCI reaction, very weak to weak (R1 to R2), 20-30% coverage of voilds 1/16" or less, 20-40% fossil casts and moids 193.4-196.0" pale yellowish brown, (10YR R/2), very fine to coarse grained, strong HCI reaction, yellow density and apparent strength and pale yellow pale or infill of an undertification, in variable with yellow pale or infill of an undertification, weak to weak (R1 to R2), 20-30% coverage of voilds 1/16" or less, 3,0-40% fossils, 10-20% coverage of voilds 1/16" or less, 3,0-40% fossils, 10-20% coverage of voilds 1/16" or less, 3,0-40% fossils, 10-20% coverage of voilds 1/16" or less, 3,0-40% fossils, 10-20% coverage of voilds 1/16" or less, 3,0-40% fossils, 10-20% coverage of voilds 1/16" or less, 3,0-40% fossils, 10-20% coverage of voilds 1/16" or less, 3,0-40% fossils, 10-20% coverage of voilds 1/16" or less, 3,0-40% fossils, 10-20% coverage of voilds 1/16" or less, 3,0-4	-			>10	orientation	世		
R26-HO 5ft 38 5 1020.5 - Fracture, 10 deg, rough, planar 2021 - Fracture, portional, rough, stepped, lithology contact 2027-203.0' - Fracture zone, multiple fracture store planar 203.1-203.3' - Fracture zone, multiple fracture store planar 206.0  R27-HO 5ft 5 5 7 8	_					+-		The conit connects of
R26-HQ St 1 80% Solution Solut	-			5	extends into underlaying unit	ፗ		
## 18	_	R26-HO				士	(10YR 6/2), very fine to medium	
fracture orientation 203.1-203.3' - Fracture zone, multiple fractures broken along fragment edges 203.7' - Fracture, 2 deg, rough, planar 206.0  A 206.2, 206.3, 201.7, 206.9' - Fractures (4), 0-10 deg, smooth, planar 207.0-208.5' - Fracture zone, 75-80 deg, multiple fractures 207.5-208.0, fragments up to 2 1/2"x1 to 1/4"x1/2"  NR 277-HO 5ft 707.7  211.0  Page HO 5 10 5 10 5 10 5 10 5 10 5 10 5 10 7 10 7	_	5 ft		5	lithology contact	+		
205 - 162.7  - 162.7	_	80%				+		
102.7				>10	203.1-203.3' - Fracture zone, multiple	丰		and apparent strength
weak to weak (R1 to R2), 20-30% coverage of voids 11/16" or less, 20-40% fossil casts and molds 207.0-208.5' - Fracture zone, 75-80 deg, miltiple fractures 207.5-208.0, fragments up to 2 1/2"x1 to 1/4"x1/2"    Value of the content						Ł	(10YR 8/2), strong HCl reaction, very	P26: 7 minutes
20.0 20.0 20.0 20.0 20.0 20.0 20.0 20.0	-			NR	3, 113, 7, 113	₩		
0-10 deg, smooth, planar 207.0-208.5 - Fracture zone, 75-80 deg, multiple fractures 207.5-208.0, fragments up to 2 1/2"x1 to 1/4"x1/2"  NR 211.0  NR 211.0    NR 211.0    NR 211.0    NR 215.	-	206.0				+	20-40% fossil casts and molds	-
207.0-208.5' - Fracture zone, 75-80 deg, multiple fractures 207.5-208.0, fragments up to 2 1/2"x1 to 1/4"x1/2"  210	-			4		士		-
R27-HQ Str. 10 Str. 50% NR 211.0  R28-HQ Str. 40% NR R215 R28-HQ Str. 40% NR R275 R275 R275 R28-HQ Str. 40% NR R275 R275 R275 R275 R275 R28-HQ Str. 40% NR R275 R275 R275 R275 R275 R28-HQ Str. 40% NR R275 R275 R275 R275 R275 R28-HQ Str. 40% NR R275 R275 R275 R275 R275 R275 R275 R27	_				•	士	<ul> <li>grained, strong HCl reaction, slightly</li> </ul>	-
R27-HQ 5 ft 50% 10	_			>10	multiple fractures 207.5-208.0, fragments up	+		-
5 ft 50% 10	_	R27-HQ		>10	to 2 1/2"X1 to 1/4"X1/2"	+	<ul> <li>1/16" or less, abundant fossils,</li> </ul>	-
196.0-198.0' - grayish orange, (10YR 7/4), medium to coarse grained, moderate HCI reaction, very weak (R1), 30-40% fossils, 10-20% coverage of solution cavities 3/8" or less 198.0-198.5' - alternating grayish orange and light brown, (10YR 7/4 to 5YR 5/6), fine grained, strong HCI reaction, weak to medium strong (R2 to R3), medium to coarse grained at alternating laminae 198.5-199.5' - strong HCI reaction, extremely weak (R0), large amount of non carbonate silt to clay-sized particles, 10% coverage of voids 1/16" or less, pyrite grains on and define laminar silt beds No Recovery 199.5-201.0'  R28: 23 minutes	_	5 ft		-10		+		-
210 -167.7 -167.7 -10 -167.7 -10 -167.7 -10 -10 -10 -10 -10 -10 -10 -10 -10 -10	_	50%				世	<ul> <li>196.0-198.0' - grayish orange, (10YR</li> </ul>	-
- 167.7  - 10 - 167.7  - 211.0  - 10 - 167.7  - 211.0  -	-			ND		╁		-
211.0  211.0 -213.0' - Fracture zone, no distinguishable orientation  212.5 -172.7 - NR  211.0 -213.0' - Fracture zone, no distinguishable orientation  213.0 -198.5' - alternating grayish orange and light brown, (10YR 7/4 to 5YR 5/6), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), medium to coarse grained at alternating laminae  198.5 -199.5' - strong HCl reaction, extremely weak (R0), large amount of non carbonate silt to clay-sized particles, 10% coverage of voids 1/16" or less, pyrite grains on and define laminar silt beds  No Recovery 199.5-201.0'  R28: 23 minutes				INIX	-	$+$ $\square$	— (R1), 30-40% fossils, 10-20%	R27: 11 minutes —
211.0-213.0' - Fracture zone, no distinguishable orientation  212.5	-	044.0				士		
Signature   Sign	-	∠11.0			211.0-213.0' - Fracture zone, no	世		1 ' ĭ
to R3), medium to coarse grained at alternating laminae 198.5-199.5' - strong HCl reaction, extremely weak (R0), large amount of non carbonate silt to clay-sized particles, 10% coverage of voids 1/16" or less, pyrite grains on and define laminar silt beds No Recovery 199.5-201.0'  Resume drilling 08:50 3/8/07	-			>10		+	5YR 5/6), fine grained, strong HCl	
R28-HQ 5 ft 40%  NR  NR    NR   Stable   Stable	-					仠		Resume drilling 08:50
R28-HQ 5 ft 40%  NR  NR  R28-HQ 5 ft 40%  NR  NR  R28-HQ 5 ft 40%  NR  R28: 23 minutes	-			>10		亡	alternating laminae	
5 ft 40%  NR  NR  NR  NR  NR  NR  R215  -172.7  R28: 23 minutes	-	R28-H0				世		
NR N	-	5 ft				世	of non carbonate silt to clay-sized	-
215 -172.7 No Recovery 199.5-201.0' R28: 23 minutes	-	40 /0				干		-
-172.7 R28: 23 minutes	215			NR		ፗ	define laminar silt beds	
216.0	-172.7				_	世	NO Recovery 199.5-201.0"	R28: 23 minutes
210.0	-	216.0				士	-	
	-	£ 10.0						



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724100.8 N, 457649.4 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 2.5 ft bgs on 03/07/07 START: 2/25/2007 END: 3/8/2007 LOGGER: J. Schaeffer, R. Gomez DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS >10 216.0-216.4' - Fracture zone, multiple Limestone fractures, fragments range from 1/4" to 201.0-202.1' - grayish orange, (10YR 7/4), strong HCl reaction, weak to medium strong (R2 to R3), carbonate Driller's Remark: Soft and rapid drilling at 216.5derived silt-sized grains 202.1-205.0' - pale yellowish brown, (10YR 6/2), mild to moderate HCI 220 0' NR R29-HQ Assume loss of recovery is reaction, extremely weak to very 0 216.4-219.7' based on 5 ft weak (R0 to R1), 10-20% sand-sized driller's report of soft and 34% matrix, 5-15% fossils, 30-40% rapid drilling at 216.5coverage of voids 3/16" of less 220.0' No Recovery 205.0-206.0 220 >10 Limestone 177 7 R29: 8 minutes 206.0-207.0' - grayish orange, (10YR 5 7/4), strong HCl reaction, very weak 221.0 (R1), thin to laminar bedding, very 221.0-222.5' - Fracture zone, 2-3 of the Driller's Remark: Drilling low density, no visible fossils, 5-15% >10 fractures are smooth and planar bedding action intermittently coverage of voids 1/16" or less, no plane partings becomes hard and soft solution cavities The final 0.5' recovered is >10 207.0-208.5' - dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), moderate to strong HCl an agglomeration, appears to have 60-80 deg planar features that may indicate R30-H0 reaction, 10-20% coverage of voids subsidence infill 0 5 ft 30% 1/8" or less, slightly friable, worm burrows in very fine grained NR limestone 207.2-208.0' No Recovery 208.5-211.0' 225 Limestone 182.7 R30: 4 minutes 211.0-213.0' - very pale orange to pale yellowish brown, (10YR 8/2 to 226.0 10YR 6/2), very fine to fine grained, 226.0-227.5' - Fracture zone, multiple very weak to weak (R1 to R2), >10 fractures no visible orientations 30-40% fossil shell fragments, casts. and molds, 20-40% coverage of >10 voids 1/6" or less, 5-10% coverage of solution cavities 3/8" or less, low to moderate density R31-HQ No Recovery 213.0-216.0' 0 5 ft Limestone 30% 216.0-216.4' - pale yellowish brown NR and grayish orange, (10YR 6/2, 10YR 7/4), fine grained, strong HCI 230 reaction, pale yellowish brown -187 7 R31: 5 minutes material is weak to medium strong (R2 to R3), non fossiliferous, grayish 231.0 orange material is very weak to weak (R1 to R2) with 30-40% fossils Discuss drilling to 265.0', 231.0-231.6' - Fracture zone, random >10 conclusion continue drilling orientations, fragments range from 1/4" to No Recovery 216.4-219.7 to 265.0' even though very Limestone low recovery and 0% RQD 219.7-221.0' - grayish orange, (10YR 7/4), strong HCl reaction, very weak to weak (R1 to R2), 40-50% fossils, for the last 5 runs (25') in hopes that borehole stays open R32-HQ 20% coverage of voids 3/8" or less, 5 ft 0 trace organics, abundant fossil casts NR 12% and molds, low to moderately dense, 15% coverage of 1/16" or less voids 235 192.7R32: 8 minutes 236.0



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-07 SHEET 13 OF 14

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724100.8 N, 457649.4 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.5	ft bgs	s on 03		/8/200		
ŽQ£	(%)		. 1	DISCONTINUITIES	90	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			>10 5	236.0-236.1' - Fracture zone, 3/4" fragments 236.4' - Fracture, horizontal, rough, planar 236.5' - Fracture, 60 deg, rough, planar 237.2, 237.3, 237.5, 237.6, 237.85' - Bedding		Limestone  - 221.0-222.5' - grayish orange, (10YR 7/4), strong HCl reaction, very weak (R1), 10-20% fossils, 10-20% coverage of voids 1/16" or less on	
- - 240 -197.7 -	R33-HQ 5 ft 40% 241.0	22	NR	plane (5), 0-5 deg, rough		surface, thin to laminar bedded, silt-sized particles  No Recovery 222.5-226.0' Limestone 226.0-227.5' - very pale orange, (10YR 8/2), very fine to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), no visible fossils, voids, or solution cavities No Recovery 227.5-231.0'	R33: 4 minutes
- - - -	R34-HQ 5 ft 22%	0	>10 NR	241.0-242.1' - Fracture zone, fragments range from 3/8" to plates 1/4"x3/8" thick and 1 1/2"x1 1/2"		Limestone 231.0-231.6' - pale yellowish brown, (10YR 6/2), 20-40% fossils, 30-40% coverage of voids 1/16" or less No Recovery 231.6-236.0' Limestone 236.0-238.0' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), very fine to medium grained, moderate to strong HCI reaction,	
245 <u> </u>	246.0		>10	246.0-247.0' - Fracture zone		very weak to weak (R1 to R2), low to moderate density, 15% of rock is medium grained, thin to laminar bedding with organics along bedding partings, bedding ranges from horizontal to 10 degrees, 5-15% coverage of voids 1/16" or less  No Recovery 238.0-241.0"	R34: 5 minutes
- - - - - 250	R35-HQ 5 ft 30%	0	4 NR	247.05, 247.2, 247.35, 247.4' - Bedding plane (4), 0-7 deg		Limestone 241.0-242.1' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), strong HCl reaction, very weak to weak (R1 to R2), 10-20% coverage of voids 1/8" or less, very fine to medium grained (medium grains constitute 30% of the unit), the unit exhibits no bedding until 241.7'	
-207.7 - - -	251.0		>10	251.25, 251.6' - Bedding plane (2) 251.6-252.3' - Fracture Zone, fragments from			R35: 8 minutes
-	R36-HQ 5 ft 48%	13	>10 fragmo 252.45 2 Fractu	1/4" to 1"x1" to 1/4"x3/8" (bedding planes), fragments are generally small 252.45, 252.6, 252.8, 252.95, 253.2, 253.4' - Fractures (6), 0-7 deg, smooth, planar, fractures or partings along bedding planes		strong HCl reaction, weak to medium strong (R2 to R3), fossiliferous, 5-10% coverage of voids 1/16" or less  No Recovery 247.5-251.0'	
- 255_ -212.7 -	256.0		NR	-	- - - - - - - - - - - - - - - -	-	R36: 7 minutes



PROJECT NUMBER:	BORING NUMBER:					
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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724100.8 N, 457649.4 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DISCONTINUITIES  DESCRIPTION  DESCRIPTION  DEPTH, TYPE, ORIGINTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS CAPING PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS CAPING CHARACTERISTICS  TO SEE SHAPE SHA								
DESCRIPTION  ROCK TYPE, COLOR, MINERALOSY, TEXTURE, SIZE AND DEPTH OF CAST FLUID LOSS, CORING ROCK TYPE, COLOR, MINERALOSY, TEXTURE, SIZE AND DEPTH OF CAST FLUID LOSS, CORING ROCK TYPE, COLOR, MINERALOSY, TEXTURE, WE AND THICKNESS, SUFFACE STAINING, AND TICHTNESS CAVING ROCK TYPE, COLOR, MINERALOSY, TEXTURE, WE AND THICKNESS, CAVING ROCK TYPE, CAVING THE AND T	WATER	LEVELS : 2.5	ft bgs	s on 03		8/200		
256.1, 256.3, 256.4, 256.6, 256.7, 256.8, 256.9. Fractures (7), horizontal, rough, planar, fractures along bedding plane parings 255.1, 157.35, 157.7, 157.9. Fractures (4), rough, planar, fractures along bedding plane parings 255.1, 258.2, 258.4, 258.7.5. Bedding plane parings 255.1, 258.2, 258.4, 258.7.5. Bedding plane (4), 0-10 deg, smooth, undulating 259.1, 259.2, 259.4, 259.5, 260.0. Fractures (5), horizontal, rough, planar, along along 260.0-260.5. Fracture zone, random orientation, fragments 1*2." 261.0. 263.0. Fractures (2), rough, planar along 260.0-260.5. Fractures (2), rough, planar along 261.0-263.0. Fractures (3), rough, planar along 261.0-263.0. Fractures (3), rough, planar along 261.0-263.0. Fractures (4), rough, planar along 261.0-263.0. Fractures (2), rough, planar along 261.0-263.0. Fractures (3), rough, planar along 261.0-263.0. Fractures (4), rough, planar along 261.0-263.0. Fractures (5), rough, planar along 261.0-263.0. Fractures (2), rough, planar along 261.0-263.0. Fractures (3), rough, planar along 261.0-263.0. Fractures (4), rough, planar along 261.0-263.0. Fractures (2), rough, planar along 261.0-263.0. Fractures (3), rough, planar along 261.0-263.0. Fractures (4), rough, planar along 261.0-263.0. Fractures (2), rough, planar along 261.0-263.0. Fractures (3), planar along 261.0-263.0. Fractures (3), planar along 261.0-263.0. Fractures (3), planar along 261.0-263.0. Fractures (4), rough, planar along 261.0-263.0. Fractures (4), planar along 2	≥□₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
256.1, 256.3, 256.4, 256.6, 256.7, 256.8, 256.9. Fractures (7), horizontal, rough, planar, fractures along bedding plane parings 255.1, 157.35, 157.7, 157.9. Fractures (4), rough, planar, fractures along bedding plane parings 255.1, 258.2, 258.4, 258.7.5. Bedding plane parings 255.1, 258.2, 258.4, 258.7.5. Bedding plane (4), 0-10 deg, smooth, undulating 259.1, 259.2, 259.4, 259.5, 260.0. Fractures (5), horizontal, rough, planar, along along 260.0-260.5. Fracture zone, random orientation, fragments 1*2." 261.0. 263.0. Fractures (2), rough, planar along 260.0-260.5. Fractures (2), rough, planar along 261.0-263.0. Fractures (3), rough, planar along 261.0-263.0. Fractures (3), rough, planar along 261.0-263.0. Fractures (4), rough, planar along 261.0-263.0. Fractures (2), rough, planar along 261.0-263.0. Fractures (3), rough, planar along 261.0-263.0. Fractures (4), rough, planar along 261.0-263.0. Fractures (5), rough, planar along 261.0-263.0. Fractures (2), rough, planar along 261.0-263.0. Fractures (3), rough, planar along 261.0-263.0. Fractures (4), rough, planar along 261.0-263.0. Fractures (2), rough, planar along 261.0-263.0. Fractures (3), rough, planar along 261.0-263.0. Fractures (4), rough, planar along 261.0-263.0. Fractures (2), rough, planar along 261.0-263.0. Fractures (3), planar along 261.0-263.0. Fractures (3), planar along 261.0-263.0. Fractures (3), planar along 261.0-263.0. Fractures (4), rough, planar along 261.0-263.0. Fractures (4), planar along 2	NA A	ANP S		ES	DESCRIPTION	13	ROCK TYPE, COLOR,	SIZE AND DEDTH OF CASING
261.0 261.0 266.0 256.1 266.3 256.4 256.6 256.7, 256.8 251.0-263.34* - pale yellowish brown, (10YR R/2), very fine to medium grained, modely dense, some coarse grained material, 25-40% fossil casts and molds 30/46 for less, 5-10% solution cavities, moderated to strong HCl reaction, yery weak to weak (R1 to reaction, very weak (R1 to reaction), very weak (R1 to reaction, very weak (R1 to reactio	H H H	RUI ÆR,	(%)	12,0	DEDTH TYPE OPIENTATION POLICHNESS	<b>1</b> 🚽		FLUID LOSS, CORING RATE AND
261.0 261.0 266.0 256.1 266.3 256.4 256.6 256.7, 256.8 251.0-263.34* - pale yellowish brown, (10YR R/2), very fine to medium grained, modely dense, some coarse grained material, 25-40% fossil casts and molds 30/46 for less, 5-10% solution cavities, moderated to strong HCl reaction, yery weak to weak (R1 to reaction, very weak (R1 to reaction), very weak (R1 to reaction, very weak (R1 to reactio	TAY:	RE NGT CO	۵	AC R	PLANARITY, INFILLING MATERIAL AND	MB		SMOOTHNESS, CAVING ROD
261.0 261.0 266.0 256.1 266.3 256.4 256.6 256.7, 256.8 251.0-263.34* - pale yellowish brown, (10YR R/2), very fine to medium grained, modely dense, some coarse grained material, 25-40% fossil casts and molds 30/46 for less, 5-10% solution cavities, moderated to strong HCl reaction, yery weak to weak (R1 to reaction, very weak (R1 to reaction), very weak (R1 to reaction, very weak (R1 to reactio	SU	CO LEI RE		F.E.	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S		DROPS, TEST RESULTS, ETC.
256.9 - Fractures (7), horizontal, rough, planar, fractures along laminae 257.15, 157.35, 157.75, 157.9 - Fractures (4), rough, planar, fractures along bedding plane parlings 258.1, 258.2, 258.4, 258.2, 526.0 - Corp. Fractures (5), horizontal, rough, planar, and molds, 30% coverage of voids 1/16" of less, 5-10% solution cavities, moderately frable at both ends of core No Recovery 253.4-256.0 - Core No Recovery 254.0 - Core No Recovery 256.0 - Core No Recover					256 1 256 3 256 4 256 6 256 7 256 8		Limestone	
R37-H0 Set 10	-			7	256.9' - Fractures (7), horizontal, rough,	╁		
R37-HO 5 ft 90% 25 4 4 (4), 0-10 deg, smooth, undulating 256.1, 258.2, 258.4, 258.75 - Bedding plane parings 256.1, 258.2, 258.4, 258.75 - Bedding plane (4), 0-10 deg, smooth, undulating 259.1, 259.25, 259.4, 259.5, 260.0' - Fractures (5), horizontal, rough, planar, along laminae 260.0-260.5' - Fracture zone, random orientation, fragments 1"-2" 261.0-263.0' - Fractures 20), 260.0-260.5' - Fractures 20), rough, planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar and planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar and planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar and planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar and planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar and planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar and planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar and planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar and planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar and planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar and planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar 262.1, 262.3, 262.6, 262.9'	-					亡		
R37.HO 5 ft   25   4   258.1, 258.2, 258.4, 258.75 - Bedding plane parings 258.1, 258.2, 258.4, 259.5, 260.0' - Fractures (5), horizontal, rough, planar, along laminate 32.2   261.0   NR 262.1   262.3   262.6   262.9' - Fractures (4), rough, planar, hard to distinguish   NR 265.1   NR 266.0   NR 266.0   NR 266.0   NR 266.0   NR 267.0   NR 268.0   NR	_			4		₽		
R37-HQ 5 ft 90% 25 4 (4) 0-10 deg, smooth, undulating 258.1, 258.2, 259.4, 259.5, 260.0' - Fractures (5), horizontal, rough, planar, along laminae 260.0-260.5' - Fracture zone, random orientation, fragments 1*-2" orientation, orientation, fragments 1*-2" orientation, fragments 1*-2" orientation, fragments 1*-2" orientation, fragments 1*-2" orientation, orientation, fragments 1*-2" orientation, fragments 1*-2" orientation, orientation, fragments 1*-2" orientation, fragments 1*-2" orientation, orientation, fragments 1*-2" orientation, orientation, fragments 1*-2" orientation, orientation, orientation, orientation, fragments 1*-2" orientation,								
(4), 0-10 deg, sintour, including 259.1, 259.2, 259.4, 259.5, 260.0' - Fractures (5), horizontal, rough, planar, along laminae 260.0-260.5' - Fracture zone, random orientation, fragments 1"-2" 261.0-263.0' - Fracture zone 261.6, 261.99' - Fractures (2), rough, planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish 265.0-260.5' - very pale orange to gravity orange, (10YR 8/2 to 10YR 7/4), very fine to medium grained, microare and thick pleds that locally contain minor amounts of organic material that locally contain minor am				,		$\vdash$		
259.1, 259.25, 259.4, 259.5, 260.0' - Fractures (5), horizontal, rough, planar, along laminae 260.0-260.5' - Fracture zone, random orientation, fragments 1"-2" - NR 261.0-263.0' - Fracture zone 261.6, 261.9' - Fracture zone 261.6, 261.9' - Fractures (2), rough, planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish    NR 266.0			25	4	(4), 0-10 deg, smooth, undulating			
Fractures (5), horizontal, rough, planar, along laminae 260.0-260.5' - Fracture zone, random orientation, fragments 1"-2" 261.0 -263.0' - Fracture zone 261.0-263.0' - Fracture zone 261.0-263.0' - Fracture zone 261.6, 261.99' - Fractures (2), rough, planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish  NR  285 -222.7  266.0  Fractures (5), horizontal, rough, planar, along laminae 260.0-260.5' - Fracture zone, random orientation, fragments 1"-2" 261.0-263.0' - Fracture zone 261.0-263.0' - Fractures (2), rough, planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish  NR  285 -222.7  266.0  R37: 4 minutes  R37: 4 minutes  R38: 7 minutes  R38: 7 minutes grained imestone very fine very fine very fine very fine yeak laminae with undulating beds, 20-30% fossils, 20-30% coverage of voids 3/16" or less, 5-10% solution cavities, friable, 30-50% silty and sand-sized grain matrix, coarse grained limestone  No Recovery 261.0-263.0'  R37: 4 minutes  R38: 7 minutes  R610-263.0' - very pale orange, (10YR 8/2), very fine for medium grained, moderately dense limestone very fine very fine to medium grained, moderately dense limestone very fine very fine to medium grained, moderately dense limestone very fine very fine to medium grained, moderately dense limestone very fine very fine to medium grained, moderately dense limestone very fine very fine to medium grained, moderately dense limestone very fine very fine very fine to medium grained, moderately dense limestone very fine very fine to medium grained, moderately dense limestone very fine very fine to medium grained, moderately dense limestone very fine very fine to medium grained, moderately dense limestone very fine very fine to medium grained, moderately dense limestone very fine very fine very fine to medium grained, moderately dense limestone very fine very fine very fine very fine to medium grained, moderately dense limestone very fine very fine	_	0070			259 1 259 25 259 4 259 5 260 0' -	╙		
261.0 NR 261.0   Secondary   S				>10		$\pm$		
261.0 NR 261.0 263.0' - Fracture zone 261.6, 261.99' - Fractures (2), rough, planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish  NR 265 265 -222.7 266.0  NR 266.0  270 286.0 256.0 - 260.5' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), very fine to medium grained, moderate to strong HCl reaction, extremely weak (RO), light to moderately dense, laminar to thin (up to 1" thick) beds that locally contain minor amounts of organic material that grade from very fine moderately dense limestone to very thin very weak laminae with undulating beds, 20-30% coverage of voids 3/16" or less, 5-10% solution cavities, friable, 30-50% silty and sand-sized grain matrix, coarse grained limestone 261.0-263.0' - very pale orange, (10YR 8/2 to 10YR 8/2 to 10Y						$\vdash$		D27: 4 minutes
261.0 NR  261.0-263.0' - Fracture zone  261.6, 261.99' - Fractures (2), rough, planar  262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish  NR  R38-HQ 5 ft 40%  NR  NR  265222.7  266.0  NR  NR  266.0  NR  267268.0' - Fracture zone  268.0 - Fracture zone  268.0 - Fractures (2), rough, planar  269.0 - Fractures (2), rough planar  269.0 - Fractures	-211.1					ᡛ		KS7. 4 IIIIIIules
moderate to strong HCI reaction, extremely weak (R0), light to moderately dense, laminar to thin (up to 1" thick) beds that locally contain minor amounts of organic material that grade from very fine moderately dense lamistone to very thin very weak laminae with undulating beds, 20-30% fossils, 20-30% coverage of voids 3/16" or less, 5-10% solution cavities, friable, 30-50% silty and sand-sized grain matrix, coarse grained limestone No Recovery 260.5-261.0' Limestone		261.0		NR	onentation, nagments 1 -2	Ш	grayish orange, (10YR 8/2 to 10YR	
261.6, 261.99' - Fractures (2), rough, planar 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish  R38-HQ 5 ft 40%  NR  NR  265 -222.7  266.0  266.0  266.0  266.0  267  268.0  269.9' - Fractures (2), rough, planar and to distinguish  NR  R38-HQ 5 ft 40%  NR  NR  R38-HQ 6 ft 40%  NR  NR  268  NR  268  NR  268  NR  269.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish  NR  NR  R38-HQ 5 ft 40%  NR  NR  R38-T minutes grained limestone No Recovery 260.5-261.0' Limestone 261.0-263.0' - very pale orange, (10YR 8/2), very fine grained, medium strong (R3), 15-20% coverage of voids 1/16" interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable intervals and strongly HCl reaction in friable intervals No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on	1 7				261.0-263.0' - Fracture zone	$\vdash$		
262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish  NR  265 -222.7  266.0  NR  266.0  262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish  NR  265 -222.7  266.0  NR  266.0  266.0  267 -268.0  268.0  269 - Fractures (4), rough, planar, hard to distinguish  NR  268.0  NR  269 - Fractures (4), rough, planar, hard to distinguish  NR  269 - Fractures (4), rough, planar, hard to distinguish  NR  260 - Fractures (4), rough, planar, hard to distinguish  NR  260 - Fractures (4), rough, planar, hard to distinguish  NR  261 - Fractures (4), rough, planar, hard to distinguish  NR  262 - Fractures (4), rough, planar, hard to distinguish  NR  265 - Fractures (4), rough, planar, hard to distinguish  NR  266 - Fractures (4), rough, planar, hard to distinguish  NR  266 - Fractures (4), rough, planar, hard to distinguish  NR  266 - Fractures (4), rough, planar, hard to distinguish  NR  266 - Fractures (4), rough, planar, hard to distinguish  NR  266 - Fractures (4), rough, planar, hard to distinguish  NR  266 - Fractures (4), rough, planar, hard to distinguish  NR  266 - Fractures (4), rough, planar, hard to distinguish  NR  266 - Fractures (4), rough, planar, hard to distinguish  NR  266 - Fractures (4), rough, planar, hard to distinguish  NR  266 - Fractures (4), rough, planar, pl	1 7			>10	261.6. 261.99' - Fractures (2) rough planar	F		
R38-HQ 5 ft 40%  NR  NR  NR  265 -222.7  266.0  NR  R38-HQ  1	-				· · · · · · · · · · · · · · · · · · ·	╁	moderately dense, laminar to thin (up	
R38-HQ 5 ft 40%  NR  NR  265 -222.7  266.0  NR  R38-HQ 5 ft 40%  R38-HQ 6 ft 5 ft 40%  R38-HQ 6 ft	-			>10		厂		
dense limestone to very thin very weak laminae with undulating beds, 20-30% coverage of voids 3/16" or less, 5-10% solution cavities, friable, 30-50% silty and sand-sized grain matrix, coarse grained limestone  No Recovery 260.5-261.0'  Limestone  266.0  No Recovery 260.5-261.0'  Limestone  261.0-263.0' - very pale orange, (10YR 8/2), very fine grained, medium strong (R3), 15-20% coverage of voids 1/16", interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable interbeds, rock has moderate HCl reaction in medium strong intervals and strongly HCl reaction in friable intervals  No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on	_	500.110				╁┯		
weak laminae with undulating beds, 20-30% fossils, 20-30% coverage of voids 3/16" or less, 5-10% solution cavities, friable, 30-50% silty and sand-sized grain matrix, coarse grained limestone No Recovery 260.5-261.0' Limestone 261.0-263.0' - very pale orange, (10YR 8/2), very fine grained, medium strong (R3), 15-20% coverage of voids 1/16", interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable interbeds, rock has moderate HCI reaction in medium strong intervals and strongly HCI reaction in friable intervals No Recovery 263.0-266.0' Bottom of Boring at 266.0 ft bgs on							dense limestone to very thin very	
NR  NR  voids 3/16" or less, 5-10% solution cavities, friable, 30-50% silty and sand-sized grain matrix, coarse grained limestone  No Recovery 260.5-261.0'  Limestone 261.0-263.0' - very pale orange, (10YR 8/2), very fine grained, medium strong (R3), 15-20% coverage of voids 1/16", interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable interbeds, rock has moderate HCI reaction in medium strong intervals and strongly HCI reaction in friable intervals  No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on						Н		
cavities, friable, 30-50% silty and sand-sized grain matrix, coarse grained limestone  266.0  266.0  266.0  266.0  266.0  266.0  266.0  266.0  267.0  268.0  268.0  268.0  269.0				l l				
sand-sized grain matrix, coarse grained limestone No Recovery 260.5-261.0' Limestone 261.0-263.0' - very pale orange, (10YR 8/2), very fine grained, medium strong (R3), 15-20% coverage of voids 1/16", interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable interbeds, rock has moderate HCl reaction in medium strong intervals and strongly HCl reaction in friable intervals No Recovery 260.5-261.0' R88: 7 minutes Removed inner core barre driller pulled 10' of outer casing and tagged depth to coverage of voids 1/16", interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable intervals No Recovery 263.0-266.0' Bottom of Boring at 266.0 ft bgs on	265			NR		╁		
grained limestone No Recovery 260.5-261.0' Limestone 261.0-263.0' - very pale orange, (10YR 8/2), very fine grained, medium strong (R3), 15-20% coverage of voids 1/16", interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable interbeds, rock has moderate HCl reaction in medium strong intervals and strongly HCl reaction in friable intervals No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on					<del>-</del>	亡	sand-sized grain matrix, coarse	
Limestone 261.0-263.0' - very pale orange, (10YR 8/2), very fine grained, medium strong (R3), 15-20% coverage of voids 1/16", interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable interbeds, rock has moderate HCl reaction in medium strong intervals and strongly HCl reaction in friable intervals No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on	-					₽		Removed inner core barrel,
261.0-263.0' - very pale orange, (10YR 8/2), very fine grained, medium strong (R3), 15-20% coverage of voids 1/16", interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable interbeds, rock has moderate HCl reaction in medium strong intervals and strongly HCl reaction in friable intervals No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on	_	266.0				口		
medium strong (R3), 15-20% coverage of voids 1/16", interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable interbeds, rock has moderate HCI reaction in medium strong intervals and strongly HCI reaction in friable intervals  No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on								
coverage of voids 1/16", interbedded with light fossil rich friable intervals, fossil casts and molds abundant in friable interbeds, rock has moderate HCI reaction in medium strong intervals and strongly HCI reaction in friable intervals  No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on								overnight, outer core barrel
with light fossil rich friable intervals, fossil casts and molds abundant in friable interbeds, rock has moderate HCI reaction in medium strong intervals and strongly HCI reaction in friable intervals  No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on						1		stayed at 256.0'
friable interbeds, rock has moderate HCl reaction in medium strong intervals and strongly HCl reaction in friable intervals No Recovery 263.0-266.0' Bottom of Boring at 266.0 ft bgs on	-					1		
HCI reaction in medium strong intervals and strongly HCI reaction in friable intervals  No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on	-					1		
- intervals and strongly HCl reaction in friable intervals  No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on	_					-		
friable intervals  No Recovery 263.0-266.0'  Bottom of Boring at 266.0 ft bgs on	_							
Bottom of Boring at 266.0 ft bgs on							friable intervals	
	1 7				_	1		_
	-					1	_ 3/3/2007	
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-08	SHEET	1	OF	15

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 3.4 ft bo	gs on 03/2	22/07 S	START: 3/12/2007 END: 3/21/2007 LOGGER: C. Wallestad, R. Gomez, R. McComb, L. Prochaska
				STANDARD	SOIL DESCRIPTION COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	010
H H H	RECOVERY (ft)			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
<u> </u>	0.0			(N)	Poorly Graded Sand With Organics (SP)
-	0.0				\ 0.0-0.3' - dusky brown, (5YR 2/2), moist, very loose,
-		1.0	SS-1	2-2-2-3 (4)	\very fine to fine grained, 15% fine grained organics,
-				(.)	Poorly Graded Sand With Silt (SP-SM)
-	2.0				\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
-					\nonplastic fines, sand is silica
-		1.4	SS-2	3-3-2-1 (5)	Poorly Graded Sand With Silt (SP-SM) 2.0-3.4' - moderate brown, (5YR 4/4), wet, loose, very
-	4.0			(-)	↑ fine to fine grained, no HCl reaction, 10-15%
-	4.0				\nonplastic fines, sand is silica Clayey Sand (SC)
5				0-1-2-2	4.0-4.9' - medium light gray, (N6), moist, soft, very fine to fine grained, no HCl reaction, 35% medium to
37.1		0.9	SS-3	(3)	high plastic fines, trace organics, sand is silica
-	6.0				-
-	0.0				Silt (ML)
-				3-10-12-13	6.0-7.2' - grayish orange, (10YR 7/4), wet, very stiff, -
-		1.2	SS-4	(22)	reaction, 5-10% very fine sand-sized, carbonate
-	8.0				\derived
_					Silt (ML)
_			00.5	16-24-5-3	8.0-8.8' - Same as 6.0-7.2' except very soft
-		0.8	SS-5	(29)	<b>1  </b>
10	10.0				<b>1  </b>
32.1					Silt (ML) 10.0-10.7' - Same as 6.0-7.2' except soft, 10-15% -
		0.7	SS-6	0-2-1-12	very fine to fine sand-sized
		0.7	33-0	(3)	
	12.0				
		0.5	SS-7	5-50/5	Silt With Sand (ML)  12.0-12.5' - Same as 10.0-10.7' except 10-15% very
_	12.9			(55/11")	fine to fine sand-sized, 5% coarse sand-sized
-					] ]
-	14.0		_	F0/0	Condu Cill (MIL)
-	14.5	0.5	SS-8	50/6 (50/6")	Sandy Silt (ML)  14.0-14.5' - grayish orange, (10YR 7/4), wet, hard,
15 <u> </u>					nonplastic, very rapid dilatancy, mild to moderate HCI / reaction, 35% very fine to medium sand-sized, all
					carbonate
-	16.0 16.3	0.1	SS-9	50/3	\ Limestone Fragments
-	10.0	0.1	00-5	(50/3")	│ 16.0-16.05' - grayish orange to dark yellowish orange, │- │ │ │ │ │ │
-					\(10YR 7/4 to 10YR 6/6), mild HCl reaction, several   _    limestone fragments of 1/4"-1/2" size
-					-
-	18.0				Silty Sand (SM)
-				47.00.00.05	18.0-19.9' - grayish orange to dark yellowish orange, - 【│ │ │ │ │ │
-		1.9	SS-10	17-28-39-22 (67)	(10YR 7/4 to 10YR 6/6), wet, very dense, fine to coarse grained, moderate HCl reaction, 25-30%
-				(,)	nonplastic fines, 10-15% fine gravel-size, all
20					carbonate



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# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 3.4 ft bo	gs on 03/2	22/07	TART: 3/12/2007 END: 3/21/2007 LOGGER: C. Wallestad, R. Gomez, R. McComb, L. Prochaska
				STANDARD	SOIL DESCRIPTION COMMENTS
Š₽€	SAMPLE	INTERVA	L (ft)	PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  BOOKMET TO SOMMET TO SOMET TO SOMMET TO SOMET TO SOMET TO SOMMET TO SOMET TO SOM
OH A		RECOVE	BV (ft)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, 의 DEPTH OF CASING, DRILLING RATE,
L HE A		I TILOGVI	<u> </u>	011 011 011 011	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	Solver of the office of the of
22.1	20.0				Silty Sand (SM)
-				10 15 17 10	20.0-21.5' - Same as 18.0-19.9' except dense
-		1.5	SS-11	10-15-17-16 (32)	<del>-</del>
-				(=)	-
-	22.0				Silty Sand (SM)
-				17-19-49-50/1	22.0-23.6' - Same as 18.0-19.9' except very dense
_		1.6	SS-12	(68)	
_	23.6			` ′	<u>_</u>
	24.0				111
	24.4	0.4	SS-13	50/5 (50/5")	Silty Gravel With Sand (GM)
25				(50/5")	24.0-24.4' - Same as 22.0-23.1' except mild HCl reaction, 60% of sample is several wafer shaped
17.1					limestone fragments to 1/4" thick
-	26.0				- <b>-</b>
-	26.0				Silty Sand (SM) Sample SS-14 is similar to SS-12 and
-					26.0-27.6' - dark vellowish orange. (10YR 6/6), wet.
-		1.6	SS-14	10-11-7-11 (18)	medium dense, fine to medium grained, mild to moderate HCI reaction, 35% nonplastic fines, trace of
_				(10)	coarse sand to fine gravel-size, trace white
_	28.0				sand-sized particles, all carbonate
l _					Silty Sand And Limestone (SM) 28.0-28.7' - Same as 26.0-27.6' except a few 1/4"
l _		0.7	SS-15	8-11-10-50/5	wafer shaped limestone fragments
		0.7	00 10	(21)	Chatter at 29.0'
30	38:8				
12.1	30.3	0.0	SS-16	50/4	Limestone Fragments
-				(50/4")	30.0' - a few coarse sand-size limestone fragments /-
-					
-	00.0				<b>- 1 1</b>
-	32.0				Silty Sand With Gravel (SM)
-					32.0-33.5' - dark yellowish orange, (10YR 6/6), wet,
-		1.5	SS-17	23-36-27-28 (63)	very dense, fine to coarse grained, mild to moderate HCl reaction, 15-20% fine gravel-size, 20-25%
-				(03)	nonplastic fines, all carbonate
-	34.0				
_		0.6	SS-18	28-50/5	Silty Sand With Gravel (SM)  34.0-34.6' - Same as 32.0-33.5' except several coarse
35	34.9			(78/11")	gravel-size limestone fragments
7.1					
	36:P				] [
_		0.0	SS-19	50/1	No Recovery 36.0' Heavy chatter at 36-37'
-				(50/1")	<u> </u>
-					<b>1  </b>
-	20.0				<b>                                     </b>
-	38:P	0.0	\SS-20 /	50/0.5	☐ Limestone Fragments
-				(50/0.5")	\ 38.0-38.04' - light olive gray, (5Y 5/2), mild HCl
-					reaction, fragments to 1/2" size, fragments are
-					-
40					
1					
		l			



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338884.FL	A-08	SHEET	3	OF	15

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION : Vertical

MATER	. =\/=\ 0	0.461	00/	20/07	TART 0/10/0007	
WATER	LEVELS	: 3.4 ft bo	gs on 03/2		TART: 3/12/2007 END: 3/21/2007 LOGGER: C. Wallestad, R. Gomez, R. McComb, L. Prochaska SOIL DESCRIPTION COMMENTS	$\neg$
≥Q⊋ l	041:5: =		1 (0)	STANDARD PENETRATION	SOIL DESCRIPTION COMMENTS	
NAN (#)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	
H BI ATIC		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND	
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
 2.1	40.0		<u> </u> 	(N)	Silty Sand (SM)	
	40.0	1.3	SS-21	24-24-50/3	40.0-41.3' - light olive brown to moderate olive brown, - 1 1 1	-
-	41.3	1.0	00 21	(74/9")	(5Y 5/2 to 5Y 4/4), wet, very dense, fine to coarse grained, mild HCl reaction, 30% nonplastic fines,	-
_	41.5				\\ \frac{5-10\%}{ \text{fine gravel-size, all carbonate}} \\ \frac{7-10\%}{ f	_
_	42.0					_
l _	42.5	0.5	SS-22	50/6 (50/6")	Silty Sand (SM)	
				(30/0)	limestone pieces	
	44.0				11	
	44.3	0.1	SS-23	50/3	Silty Sand (SM)	_
45				(50/3")	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	_
-2.9						
-	40.0				11	-
-	46.0 46.2	0.1	SS-24	50/2	☐ Limestone Fragments	-
-				(50/2")	\delta 46.0-46.05' - moderate yellowish brown, (10YR 5/4), /-	-
-					mild HCl reaction, 2 wafer shaped limestone pieces, / 1/8"-1/4" thick, voids up to 1/16" over 30% of surface	-
-					-	-
_	48.0		00.05	50/5	Citin Cond (CM)	-
-	48.4	0.3	SS-25	(50/5")	Silty Sand (SM) √ 48.0-48.3' - Same as 42.0-42.5' except more	_
_					\limestone fragments	_
l _						
50	50.9					
-7.9		0.0_/	SS-26	50/1 (50/1")	Limestone Fragments  50.0' - recovered one 1/4" limestone fragment	
				(30/1)	30.0 - Tecovered one 1/4 Timestone magnificity	
	52.0				11	
-					Silty Sand (SM) Sample SS-27 and similar samples may be	_
-				14-25-24-16	52.0-53.7' - Same as 48.0-48.3' - extremely weak limestone	-
-		1.7	SS-27	(49)	7.1.1.1	-
-	E40				<u>-</u> 11.1.	-
-	54.0 54.3	0.2	SS-28	50/4	¬ Silty Sand (SM)	-
				(50/4")	\\\ 54.0-54.2' - Same as 52.0-53.7' \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-
55 <u> </u>						_
						-
-	<u>5</u> 6:₽	0.0	SS-29	50/1	Channel delling for the day 0/40/07 at 47:50	_
-		/	\33-29	50/1 (50/1")	Limestone Fragments  Stopped drilling for the day 3/12/07 at 17:50 at 56'	, _
					Surface collapse 3/13/07 at 07:45, driller	_
_					rebuilding surface with dirt; will insert HW casing	
	58.0				HW casing set to 14' at 09:40	
]	58.6	0.4	SS-30	24-50/1	Silty Sand With Gravel (SM) Resume drilling at 10:15 on 3/13/07	
]	55.0			(74/7")	58.0-58.4' - Same as 52.0-53.7' except moderate yellowish brown, (10YR 5/4), wet, hard, nonplastic,	
]					very rapid dilatancy, mild HCl reaction, 20-25% fine to /	_
60					coarse sand-size, 30% fine gravel-size, all carbonate	_



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 3.4 ft bo	gs on 03/2	22/07	START: 3/12/2007 END: 3/21/2007 LOGGER: C. Wallestad, R. Gomez, R. McComb, L. Prochaska
>00				STANDARD	SOIL DESCRIPTION g COMMENTS
N HE ON	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH BI FACE	RECOVERY (ft)			MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
-17.9	60.0 60.6	0.5	SS-31	27-50/1 (77/7")	Silty Sand With Gravel (SM) 60.0-60.5' - Same as 58.0-58.4' except 20% fine to
_				(11/1)	\coarse sand-size, 30-35% gravel-size limestone /
-	1				\fragments in wafer shapes \frac{1}{2}
-	62.0 62.3	0.2	SS-32	50/3	Limestone Fragments
-	- 02.0	<u> </u>	00 02	(50/3")	│
-	1				\HCI reaction, 1/4" thick wafer shaped limestone \fragments
-	64.0				-
-	64.4	0.2	SS-33	50/5	Limestone Fragments 64-64.7' heavy chatter
65_				(50/5")	64.0-64.2' - Same as 62.0-62.2'
-22.9	66.0				<u> </u>
-	66.3	0.3	SS-34	50/5 (50/5")	Silty Sand (SM) 66.0-66.3' - moderate yellowish brown to dark
-	-			(50/5)	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-	-				\coarse grained, mild HCl reaction, 30-35% nonplastic \ fines, 20% fine size, all carbonate
-					Begin Rock Coring at 66.0 ft bgs See the next sheet for the rock core log
-	1				See the next sheet for the rock core log
-					1
-					1
70					
-27.9					
-	-				<u> </u>
-	-				-
-	1				
-	1				-
-	1				†
-	1				1
					]
75					<u> </u>
-32.9	_				_
-	-				
-	1				-
-	1				<del> </del>
-	1				
-	1				1
	1				1
	]				]
80					



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-08

SHEET 5 OF 15

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 3.4	ft bgs	on 03	3/22/07 START : 3/12/2007 END : 3/2	21/20	07 LOGGER : C. Wallestad, R. Gom	nez, R. McComb, L. Prochaska
>00	(9			DISCONTINUITIES	ß	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ACE ATTO	TH.,	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	٦ ا	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
F.F.	ORE ENG	Ø	AAC.	PLANARITY, INFILLING MATERIAL AND	/MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
		₩.	# #	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	, , ,
	66.0		<10	66.0-66.2' - Fracture zone 66.3' - Fracture, horizontal, smooth, planar,	╙	Limestone - 66.0-70.6' - moderate yellowish	Geophysical testing performed prior to rock -
			110	open	$\Box$	brown, (10YR 5/4), very fine to fine	coring, depth tagged at
			3	66.8-67.0' - Fracture, 50-55 deg, rough, planar, tight		grained, mild HCl reaction, very weak to weak (R1 to R2), <1/16" voids on	65.5'
			3	67.2' - Mechanical break	Н	15-20% of surface	1
	R1-HQ			67.3-67.9' - Fracture, 10-50 deg, rough,	H		1
-	5 ft 92%	65	1	planar, tight 68.2' - Fracture, 10 deg, rough, planar, open		-	1
			_	68.4-68.55' - Mechanical break, 30 deg,	╙	-	SC-1 collected at 69.4-
70			3	smooth, planar, open <1/16" - 68.95-69.0' - Fracture, 30 deg, smooth,		<del> </del>	70.5'
-27.9			0	planar, silt and/or clay sized infilling, <3/16"	$\perp$		R1: 8 minutes
-	<b>-</b> 4.0		NR	thick, open 69.4, 69.5' - Fractures (2), horizontal,	╁	– No Recovery 70.6-71.0'	1
-	71.0		INK	smooth, planar, silt infilling, open	Ħ	Limestone	-
-			0	70.5' - Fracture, horizontal, smooth,	╫	- 71.0-75.2' - Same as 66.0-70.6'	1 -
-				undulating, open 71.4' - Fracture, 20 deg, rough, undulating,	$\perp$	except 5-10% solution cavities up to 3/8" at 72.6-75.2', weak to medium	SC-2 collected at 71.4-
-			2	trace red laminated staining, open	仜	- strong (R2 to R3) at 74.0-75.0'	72.85' -
_	D0 110			72.35' - Fracture, horizontal, rough, planar 72.75, 72.9' - Fractures (2), 30 deg, rough,	╁╴	<u>-</u>	1 -
-	R2-HQ 5 ft	73	3	planar, tight		<u> </u>  -	1
_	96%			73.0' - Fracture, horizontal, rough, stepped, trace silt and/or clay infilling		<u>-</u>	_
_			0	73.3-73.6' - Fracture, 80 deg, rough,	╙	_	
75				undulating, tight 73.6' - Fracture, horizontal, rough, undulating, —			
-32.9			2	tight		75.2-75.8' - moderate yellowish	R2: 7 minutes
	76.0		NR.	73.6-74.25' - Fracture, 60 deg, rough,	Ь	brown, (10YR 5/4), fine grained, mild	
	·		>10	undulating, tight 75.3, 75.5' - Fractures (2), horizontal, rough,	Ė	HCl reaction, extremely weak to very weak (R0 to R1), trace voids to 1/8",	
			-10	stepped, <3/16" silt infilling, open 1/8"		trace casts/ cavities up to 3/8"x9/16"	1
				75.5-75.8' - Fracture, 75 deg, rough,	Ш	No Recovery 75.8-76.0' Limestone	SC-3 collected at 76.9-
			3	76.0-76.05' - Clay seam, dark organic rich		76.0-78.9' - light gray to very pale	77.8'
	R3-HQ			clay 76.05-76.6' - Fracture zone	ш	<ul> <li>orange, (N7 to 10YR 7/2), very fine to fine grained, moderate HCl reaction,</li> </ul>	1
_	5 ft 64%	23	7	76.8-76.9' - Mechanical break or fracture, 15	╁	weak (R2), trace voids to 1/16", trace	1
-	3.73			deg, rough, undulating, open 77.7' - Fractures, multiple vertical fractures		casts/cavities to 3/4"x3/8"	] 1
80				77.8-78.2' - Fracture, 75 deg, smooth,	<b>1</b> ///	Clay (CL) 78.9-79.2' - grayish brown, (5YR 3/2),	
-37.9			NR	undulating, tight — 77.8-78.2' - Fracture, rough, planar,	<b>/</b> ///	mild HCl reaction, organic, laminated	R3: 8 minutes
-	04.0			orthogonal to above, tight	<b>\</b> ///	No Recovery 79.2-81.0'	-
-	81.0			78.2-78.9' - Fracture, vertical, rough, undulating, trace black powdery staining, tight		Limestone	1 1
-			1	78.9-79.2' - Bedding plane, horizontal,	F	- 81.0-83.3' - moderate vellowish	-
-				smooth, undulating, 1/4"-1/2" thick, open 1/8" -	Ħ	brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2),	SC-4 collected at 82.4-
-			1	81.7' - Fracture, 15 deg, rough, planar, <1/16" thick silt or/and clay sized infilling, 1/4"	₽	<ul> <li>15% voids &lt;1/16", 5-10% solution</li> </ul>	83.3'
-	D4 LIO			open -	П	cavities up to 3/8", 10-15% fine sand with limestone, weak (R2), same	-
-	R4-HQ 5 ft	88	3	82.4' - Fracture, 15 deg, rough, undulating, open	仜	- color, 20-25% voids	-
_	100%			83.3, 83.6, 84.3' - Fractures (3), horizontal,	$\vdash$	83.3-83.6' - transition zone as rock from 81.0-83.3' grades into material	-
_			1	rough, planar, silt and/or clay sized infilling, open	厈	at 83.6-86.4'	_
85				83.6-83.7' - Fracture zone	片		]
-42.9			0	84.8' - Mechanical break	$\vdash$	_	R4: 7 minutes
	86.0		J		Ш		
					1		



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

WATER	LEVELS: 3.4	ft bgs	s on 0	3/22/07 START : 3/12/2007 END : 3/	21/20	07 LOGGER : C. Wallestad, R. Gom	ez, R. McComb, L. Prochaska
<b>≥</b> ∩≎	(%)			DISCONTINUITIES	စ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
FACE MATIC	E RU STH, OVEI	(%) <sub>Q</sub>	STUF FOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	S S	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				86.2' - Fracture, 10 deg, rough, undulating,		Limestone	
_			0	open	┢	<ul> <li>83.6-86.4' - pale yellowish brown, (10YR 6/2), fine grained, moderate</li> </ul>	1
_				-	Ь	HCl reaction, weak (R2), 20-25%	SC-5 collected at 88.6-
			4	87.35' - Fracture, horizontal, smooth, undulating, 1/4" hard infill, tight	$\vdash$	<ul> <li>coverage of voids up to 1/16", 25% casts/ cavities up to 3-1/8"x1-9/16" at</li> </ul>	89.5'
	R5-HQ 5 ft	71	2	87.6' - Fracture, horizontal, smooth, undulating, silt and/or clay sized infilling, 1"	H	83.6-84.8', trace casts/cavities (up to 3/4"x3/8") throughout, single large	]
	100%	/ 1		thick infilling, tight	F	(2-3/4"x3/4") cavity at 86.0'	]
_			1	87.75' - Fracture, horizontal, smooth, undulating, 1/2" silt infill, tight to 1/2" open	H	86.4-91.0' - moderate yellowish brown, (10YR 5/4), fine grained,	
90			·	88.0' - Fracture, horizontal, smooth,	H	strong HCl reaction, very weak to weak (R1 to R2), fossil casts and	
-47. <del>9</del>			1	undulating, silt and/or clay sized infilling, tight, 1/2" silt infill, 1/4" open	H	<ul> <li>molds, 3/16" voids on 15% of</li> </ul>	R5: 7 minutes
_	91.0			88.35' - Fracture, horizontal, smooth, stepped, tight	₽	surface, 10% solution cavities up to 3-1/8"x3/4"	-
_			0	88.6' - Fracture, horizontal, smooth,		_ 91.0-92.9' - moderate yellowish	-
-				undulating, 1/8"-1/2" open 89.8' - Mechanical break		brown mottled very pale orange, (10YR 5/4 mottled 10YR 6/2), fine	SC-6 collected at 94.0-
-			1	90.5' - Fracture, 2-4 deg, smooth, undulating,	匚	grained, moderate HCl reaction, very weak to weak (R1 to R2), 10-20%	94.9'
-	R6-HQ			tight 92.6' - Fracture, 5-7 deg, rough, planar, <3/8" <sup>-</sup>	仜	voids <1/8", 5-10% solution cavities	-
-	5 ft 100%	93	3	thick infilling, carbonate silt, open 93.0' - Fracture or mechanical break,	仜	up to 1-3/16"- 1-9/16", partially to completely infilled with white to	-
_	10070			horizontal, rough, undulating, white infilling		yellowish gray (5Y 5/1) carbonate, extremely weak (R0) material	
95			2	1/16" thick, tight 93.2, 93.6' - Mechanical break (2)	Ь	92.9-96.0' - yellowish gray to very	1
-52.9			_	94.0, 94.9' - Fractures (2), horizontal, rough, undulating, open	H	mpale orange, (5Y 8/1 to 10YR 8/2), fine grained, strong HCl reaction,	R6: 15 minutes
	96.0		2	95.2' - Fracture, horizontal, smooth, planar,	F	weak to medium strong (R2 to R3),	]
			2	dark brown clay infilling 3/4" thick 95.9-96.0' - Fracture or mechanical break, 30	H	5% voids, 2-5% solution cavities 96.0-101.0' - very pale orange to	]
_				deg, rough, planar, tight 96.25-96.35' - Fracture, 45 deg, rough,	H	yellowish gray, (10YR 8/2 to 5Y 7/2), fine grained, strong HCl reaction,	
_			3	planar, open		very weak (R1), 10-15% voids up to	SC-7 collected at 98.15- 98.9'
-	D7.110		_	96.95' - Fracture, horizontal, smooth, planar, fractured along contact	H	1/16", trace casts/cavities up to 3/8" diameter, 10% irregular black	-
_	R7-HQ 5 ft	58	1	97.05' - Fracture, horizontal, rough, planar,	L	laminae/inclusions at 96.5-97.5'	-
-	100%			tight 97.4, 97.6, 98.9' - Fractures (3), 0-5 deg,	L	-	-
-			2	rough, undulating, up to 1/8" open 99.3' - Mechanical break	₽	-	
100_ -57.9				99.6' - Fracture, 0-30 deg, rough, undulating, —	H	_	R7: 6 minutes —
-	101.0		2	tight 100.0' - Mechanical break	Ħ	-	-
-	101.0		NA	100.5-101.05' - Fracture, 70 deg, rough, undulating, open 1/8"-1/4"		Poorly Graded Sand (SP)	] 1
-			1	101.4' - Fracture, 30 deg, rough, undulating,	F	101.0-101.4' - grayish orange, (10YR / 7/4), very fine to fine grained, strong	1
_			3	sand/rock contact 102.25' - Fracture, horizontal, rough, planar,	H	HCl reaction, 80% carbonate, 20%	SC-8 collected at 103.05-
			ى 	tight	Ш	- \silicate _ Limestone	103.95' -
] ]	R8-HQ 5 ft	46	2	102.8' - Fracture, 10 deg, rough, undulating, open	口	101.4-106.0' - very pale orange to grayish orange, (10YR 8/2 to 10YR	]
-	100%	.0	_	102.85-103.05' - Fracture, 60 deg, rough, undulating	口	7/4), fine grained, strong HCl	]
-			>10	103.95' - Fracture, 20-25 deg, rough, planar,	缸	reaction, extremely weak to very weak (R0 to R1), trace voids up to	_
105 -62.9				open 103.95-104.2' - Fractures (3), rough, —	上	1/16", no visible casts/cavities	R8: 10 minutes
-02.9			>10	undulating, open 104.5' - Mechanical break	Н	-	1.0. 10 Hilliules -
	106.0			104.3 - Miconallical Dicak			-
1					1		

ORIENTATION: Vertical



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 3.4	ft bgs	on 03	3/22/07 START : 3/12/2007 END : 3/2	21/20	07 LOGGER : C. Wallestad, R. Gon	nez, R. McComb, L. Prochaska
≥∩æ	. (9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	RQ	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS 104.65-105.0' - Fracture zone	SYM	AND ROCK MASS CHARACTERISTICS  Limestone	DROPS, TEST RESULTS, ETC.
-			3	105.3-105.45' - Fracture, 45 deg, rough, undulating, open 105.45-106.0' - Fracture zone	Ē	<ul> <li>106.0-111.0' - very pale orange to yellowish gray, (10YR 8/2 to 5Y 7/2), fine grained, strong HCl reaction,</li> </ul>	SC-9 collected at 110.0-
-	R9-HQ		3	106.0-106.1' - Fracture, vertical, rough, undulating, 1/4" open 106.1, 106.3' - Fractures (2), vertical,	Ħ	<ul> <li>very weak to weak (R1 to R2), 20% voids up to 1/16" on surface, casts/cavities up to 1-9/16" on 10%</li> </ul>	111.0'
-	5 ft 100%	66	2	smooth, planar, open 107.3, 107.5' - Fractures (2), horizontal, smooth, planar, <3/16" open		of surface	-
110 -67.9			3	107.9, 108.25-108.3' - Fractures (3), 30 deg, smooth, undulating, tight 109.0' - Fracture, horizontal, rough,	Ħ	_	R9: 6 minutes
-	111.0		0	undulating, open 109.45' - Fracture, horizontal, smooth, undulating, 1/8" open		_ 111.0-116.0' - very pale orange to	-
-			2	109.6' - Fracture, 10 deg, rough, stepped, 1/8" open 109.7' - Fracture, 10 deg, rough, undulating,	Ħ	<ul> <li>yellowish gray, (10YR 8/2 to 5Y 7/2), fine grained, strong HCl reaction, very weak (R1), trace voids to 1/16",</li> </ul>	- SC-10 collected at 113.65-
-	R10-HQ		0	open 110.0' - Fracture, horizontal, rough, undulating		- trace cavities to 3/8" diameter at 113.6'	114.55' -
-   -	5 ft 100%	90	3	111.3' - Mechanical break, horizontal 111.65-111.85' - Fracture, 45 deg, rough, planar, tight	H	-	- Driller's Remark: Lost
115 -72.9			1	113.2' - Fracture, horizontal, rough, stepped, 1/8" open 113.4' - Mechanical break	Ė	_	circulation at 115' -
-	116.0		1	113.65, 114.55' - Fractures (2), horizontal, rough, undulating 115.5' - Fracture, horizontal, smooth,	Ħ	_ 116.0-121.0' - very pale orange to	-
-			4	undulating, open 116.1, 116.25' - Mechanical break (2) 116.25-116.8' - Fractures (2), 75 deg, rough,		<ul> <li>pale yellowish brown, (10YR 8/2 to 10YR 6/2), fine to medium grained, strong HCl reaction, very weak (R1),</li> </ul>	SC-11 collected at 120.2-
-	R11-HQ		7	undulating, 10% black stain, open 116.8' - Fracture, 30 deg, rough, undulating, open 117.1-117.2' - Fracture, 52 deg, rough,		<ul> <li>voids (1/16") on 10% of surface,</li> <li>15-20% casts/cavities, single cavity</li> <li>(2"x1-3/16") at 114.5', poorly</li> </ul>	121.0' -
-	5 ft 100%	33	3	planar, 1/8" open 117.35' - Fracture, horizontal, rough, planar 117.65-117.9' - Fracture, rough, planar, 1/8"		- fossiliferous -	-
120 -77.9			4	open 117.9-118.2' - Fracture zone — 118.8, 119.5, 119.3' - Fractures (3), 10 deg,		-	R11: No runtime recorded
-	121.0		1	smooth, undulating, tight  118.9' - Fracture, 20 deg, rough, undulating, tight	H	- - 121.0-122.65' - Same as	]
-			5	197.3, 197.5' - Fractures (2), <5 deg, rough, stepped, open 119.7-119.8' - Fracture, 30 deg, rough,		- 116.0-121.0' except trace cavities up to 9/16"x3/16"	SC-12 collected at 123.7-
-	R12-HQ		3	undulating, open 119.9-120.0' - Mechanical break 120.2' - Mechanical break		122.65-126.0' - very pale orange, (10YR 8/2), fine grained, strong HCl	124.5'
-	5 ft 100%	34	2	121.15, 121.2' - Fractures (2), horizontal, smooth, planar, open 1/4" to tight 121.15-121.4' - Fracture, 60 deg, rough,	Ė	reaction, very weak (R1), trace voids to 1/16", 25-30% casts up to 3/8"x3/4" at 122.65-123.7', highly feelill for the second of	]
125 -82.9			2	undulating, 30% black staining 121.7' - Bedding plane, horizontal, smooth, planar, <1/8" open	H	- fossiliferous 	R12: 5 minutes
	126.0		>10	121.95' - Fracture or bedding plane, horizontal, smooth, planar, <1/8" open			



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

				HENT . CIVIE 330X 3/N 340233, HILL TOTALLY, FIQ 10015, FIV			ORIENTATION: Vertical
WATER	LEVELS: 3.4	ft bg	s on 0	3/22/07 START : 3/12/2007 END : 3/	21/20	D7 LOGGER : C. Wallestad, R. Gome	ez, R. McComb, L. Prochaska
300	<u></u>			DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		Ś	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
	N. Y.	ું	FRACTURES PER FOOT		윽	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
FAZ E	ST NO	(%) Q	달	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BO	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
ENE EN	RNA	Ø	RA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	≥	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
Δош	0 1 12	ď	шД		S		
				122.25-122.6' - Fracture, 60 deg, rough,	ш	Limestone	
_			>10	stepped, tight 122.6-122.7' - Fracture, 25 deg, rough,	т	<ul> <li>126.0-129.5' - fine grained, strong</li> <li>HCl reaction, very weak to weak (R1</li> </ul>	
-				undulating		to R2), voids <1/16" on 3-5% of	-
_			10	123.3-123.6' - Fracture, 75 deg, rough,	₽₩	- surface, trace fossils (molds/casts),	_
				undulating, tight	П	rare intraclasts	
	R13-HQ	į		124.5' - Fracture, 35 deg, smooth, planar		-	
-	5 ft	0	10	124.8-126.0' - Fracture zone	ш	-	-
_	70%			126.0-127.0' - Fracture zone, 0-60 deg, rough, undulating to stepped, open	$+\pi$	-	_
			10	127.0, 127.25' - Fractures (2), <5 deg, rough,		_	
130				stepped, open	Ш	No Recovery 129.5-131.0'	
-87.9			NR	127.45' - Fracture, 60 deg, smooth,	ĦП		R13: 6 minutes
-			INIX	undulating, open		_	-
_	131.0			127.7-128.0' - Fracture, 60-90 deg, smooth,	щ	_	
			۱	stepped, tight, vertical from 128.0' to 128.3' 128.3' - Fracture, horizontal, rough, stepped,		Limestone	
_			10	open		- 131.0-131.5' - pale yellowish brown,	_
-				128.75' - Fracture, 60 deg, rough, stepped,	ш	_ (10YR 6/2), medium to coarse grained, strong HCl reaction, very	-
_			5	open .	H	- weak (R1), 50-60% voids up to 3/8",	
			ਁ	129.0-129.25' - Fracture zone, horizontal,		fossils (molds/casts) common	
	R14-HQ		. 40	smooth, undulating to stepped, tight to open	Н	131.5-133.8' - grayish orange, (10YR	
-	5 ft	15	>10	131.2' - Fracture, <5 deg, rough, undulating 131.45' - Fracture, <5-30 deg, rough,	$\mathbf{t}$	- 7/4), fine to very fine grained, strong	-
_	56%			stepped, open		HCl reaction, weak to medium strong (R2 to R3), chalk like	_
				131.45-131.65' - Fracture zone, various	Ш	No Recovery 133.8-136.0'	
135			NR	orientations, rounded gravely limestone		no necessary recits recit	
-92.9			INIC	131.65-132.0' - Fracture, <5-90 deg, rough, —	1_		R14: 4 minutes
-				undulating, open 132.0-132.3' - Fracture zone, 60 deg, rough,	+	-	-
_	136.0			stepped, intersected by 40 deg inclined			
			>10	fracture, tight	$\blacksquare$	Limestone	
			> 10	132.5' - Mechanical break	Н	<ul> <li>136.0-137.3' - pale yellowish brown alternating with very pale orange</li> </ul>	
-				132.75-133.0' - Fracture, 70 deg, rough,		laminae, (10YR 6/2 alternating with	
_			>10	undulating, tight	$\perp$	- 10YR 8/2), fine grained, weak to	_
				133.0-133.2' - Fractures (2), vertical, rough, undulating, vertical and horizontal	$\perp$	medium strong (R2 to R3), 15-20%	
	R15-HQ		١	intercecting fractures		silty matrix, voids <1/16" on 10-15%	
1 -	5 ft	0	>10	133.25, 133.35, 133.4' - Bedding plane (3),	┧	of core surface, trace fossils	7
-	76%		<b>—</b>	horizontal, smooth, open	+	(echinoderms) 137.3-139.8' - Same as 136.0-137.3'	-
-			>10	133.4-133.6' - Fracture zone, various	Ш	- except densely fractured, laminated	
140			$\vdash$	orientations, gravel sized limestone rock fragments, angular —	H	to massive bedding, fossils rare to	
-97.9			ND	136.0-139.8' - Fracture zone, multiple	Ľ	absent, incipient fractures common,	R15: 5 minutes
-			NR	fractures ranging from horizontal to vertical,	Ш	- "chalky" appearance	1
-	141.0			stepped to undulating, rough, tight to open	HH	No Recovery 139.8-141.0'	4
			5	141.0-141.1' - Fracture zone, various	Ш	Limestone - 141.0-143.8' - light gray, (N7), fine to	
				orientations, producing limestone rock	Щ	very fine grained, mild HCl reaction,	
-				fragments 141.5, 142.8, 143.4' - Fractures (3),	H	medium strong to strong (R3 to R4),	SC-13 collected at 141.4-
-			1	horizontal, rough, undulating	世	- 5-10% voids <1/16", 15-20% solution	142.8'
-					ш	cavities up to 1-3/6" heavily	
	R16-HQ		_		Н	bioturbated especially in upper section, fossil casts/molds common	
1 7	5 ft 100%	48	5	143 7 143 0' Fracture zono 0 00 dos		·	1
-	100 /0			143.7-143.9' - Fracture zone, 0-90 deg, rough, undulating to stepped	Ш	- 143.8-145.0' - fine to medium	+
-			>10	144.0' - Fracture. <5 deg. rough, open	HH	grained, mild HCl reaction, very weak to weak (R1 to R2), brecciated	4
145_				144.3' - Fracture, <5 deg, rough, stepped,		— appearance, fossils rare to absent,	
-102.9				open open	Ш	1-2% voids to <1/16", occasional thin	R16: 16 minutes
1 7	440.0		10	•	H	black organic laminae	†
-	146.0	-	$\vdash$		F		
•		l	i l		1		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-08

SHEET 9 OF 15

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 3.4	ft bgs	on 03	3/22/07 START : 3/12/2007 END : 3/3	21/200	D7 LOGGER : C. Wallestad, R. Gom	nez, R. McComb, L. Prochaska
≥D≎	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - - 150 -107.9	R17-HQ 5 ft 100%	90	2 0 1 0	144.3-145.2' - Fracture zone, rough to smooth, various orientations, open to tight, limestone rock fragments 145.2' - Bedding plane, horizontal, smooth, open 145.4' - Fracture, <5 deg, smooth, undulating, tight, black crystalline-like grains over 10-15% of surface 146.1' - Fracture, <5 deg, rough, stepped to undulating, open 146.35' - Fracture, 10 deg and vertical, rough, planar, tight 148.3' - Fracture or mechanical break, horizontal, rough, undulating 150.6' - Fracture, horizontal, rough, planar,		Limestone  145.0-146.0' - dark yellowish brown, (10YR 4/2), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), laminated bedding alternating between pale yellowish brown (10YR 6/2) and dark yellowish brown (10YR 6/6), incipient hairline fractures throughout length of interval 146.0-151.0' - mottled yellowish gray to grayish orange, (5Y 7/2 to 10YR 7/4), fine to very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), thinly laminated to massive bedded, rare	SC-14 collected at 146.8- 147.9' - - - - R17: 5 minutes -
- - - - - 155_ -112.9	R18-HQ 5 ft 100%	80	1 2 >10 >10 1	tight 151.0-152.3' - Fracture, vertical, rough, undulating, tight, tiny black crystalline-like grains  152.74' - Fracture, <10 deg, rough, stepped, black tiny crystals over 2% of surface, open 153.3, 153.6' - Fractures (2), <10-40 deg, rough, planar to stepped, open 153.7-154.1' - Fracture zone, stepped to planar, horizontal to slightly inclined, bedding laminae, open 154.25' - Fracture, 20 deg, smooth, undulating, tight 154.64' - Fracture, horizontal, rough,		solution cavities, 5-10% voids up to 1/16", rare macro fossils 151.0-153.3' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak to medium strong (R1 to R3), voids (1/16") over 3-5% of surface, trace cavities, trace fossil casts becoming thinly laminated with depth, some mottling 153.3-153.8' - Same as 151.0-153.5' except with cavities and voids on 20-25% of surface, few thin laminae 153.8-156.0' - mottled yellowish gray to yellowish gray, (5Y 7/2 to 5Y 8/1), fine grained, strong HCI reaction,	SC-15 collected at 155.05- 156.0' - - - - - R18: 8 minutes
- - - - 160_ -117.9	R19-HQ 5 ft 100%	100	0 1 2 0	stepped, tight 155.05' - Fracture, horizontal, rough, planar, open, silty infilling  157.8' - Fracture, 5 deg, smooth, planar, tight 158.4, 158.8' - Fractures (2), 2 deg, rough, stepped, tight		very weak to weak (R1 to R2), thinly laminated, numerous bedding plane separations in upper 1/3 of interval, becoming chalk-like with depth, fossils rare to absent 156.0-161.0' - very pale orange to grayish orange, (10YR 7/4 to 10YR 8/2), very fine grained, strong HCI reaction, very weak to weak (R1 to R2), 10-15% fossil shells/casts decreasing with depth, voids (1/16") over 1-3% of surface, rare cavities, occasionally thinly laminated, chalk-like texture at 158.4-158.8'	SC-16 collected at 158.4- 150.3' - - - - - R19: 7 minutes
- - - - - 165	R20-HQ 5 ft 94%	68	5 3 0	161.7-162.0' - Fracture zone, horizontal and vertical, smooth, planar to undulating, open 162.0-162.5' - Fracture, 80 deg and vertical, rough, planar to undulating, open 162.55-163.0' - Fracture, 70 deg, rough, undulating, open		161.0-165.7' - Same as 156.0-161.0' except voids up to 30-40% on upper 1' of interval, voids becoming less dense with depth, massive bedding with thin laminae near base	SC-17 collected at 163.85- 164.9' - - -
-122.9 -	166.0		3 NR	164.9' - Fracture, horizontal, smooth, planar, — 3/16" thick silt and/or clay sized infilling, open .		No Recovery 165.7-166.0'	R20: 8 minutes



PROJECT NUMBER: BORING NUMBER:

338884.FL A-08

SHEET 10 OF 15

ORIENTATION: Vertical

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 3.4	ft bgs	s on 0	3/22/07 START : 3/12/2007 END : 3/2	21/20	07 LOGGER : C. Wallestad, R. Gom	ez, R. McComb, L. Prochaska
<b>≥</b> ∩≎	(%)			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-	. 034	ш	3	165.4, 165.72, 165.78' - Bedding plane (3), horizontal, smooth to undulating, rough to	0 	Limestone - 166.0-166.8' - very pale orange,	_
-			>10	loose 166.2, 166.8, 166.9' - Fractures (3), horizontal, smooth, planar, fractured along laminated bedding, open		(10YR 8/2), very fine grained, strong HCl reaction, very weak to weak (R1 to R2), up to 3/8" solution cavities on 3-4% of surface, up to 1/16" voids on	SC-18 collected at 168.3- 169.65' -
-	R21-HQ 5 ft 100%	52	2	167.0-168.0' - Fracture zone, horizontal, smooth, planar, fractured along laminated - bedding, open		15-20% of surface 166.8-169.2' - moderate yellowish brown, (10YR 5/4), fine grained, mild	-
170_			1	168.1, 168.4, 169.95' - Fractures (3), 1-2 deg, smooth to rough, trace of silt		to moderate HCl reaction, very weak (R1), 15-20% voids, 1-2% solution cavities up to 3/8", gradational	
-127 <u>.9</u> - -	171.0		2	170.65' - Fracture, 5-10 deg, rough,		contact with interval below - 169.2-171.0' - Same as 166.0-166.8'	R21: 7 minutes  End of shift; stop drilling 3/15/07 at 10:00
-			1	undulating, trace silt, open 170.8' - Fracture, 1-2 deg, rough, stepped, open 171.25, 171.4, 171.8' - Fracture zone (3), 70		171.0-173.6' - moderate yellowish - brown, (10YR 5/4), mild to moderate HCl reaction, strong (R4), voids over 15-20% of surface, up to 3/4"x3/8"	Bottom of hole tagged at 171' Resume drilling 3/20/07 at -
-	R22-HQ		4	deg, rough, planar, cobble size fragments - 172.75' - Fracture, 20 deg, rough, undulating, open		- cavities	12:22 R. McComb begins logging hole –
-	5 ft 100%	66	3	173.05, 173.7' - Fractures (2), horizontal, rough, planar to stepped, open 173.55' - Fracture, <5 deg, smooth,		173.6-173.9' - Same as 171.0-173.6 except no voids, no cavities, finely	SC-19 collected at 171.45- 172.75' -
175 -132.9	75_ 2.9		1	surface 174.0-174.3' - Fracture, 70 deg, planar to		R22: 10 minutes	
-	176.0		5	undulating, tight 174.3' - Fracture, horizontal, smooth, planar, open		-	
-			3	174.6' - Fracture, 70 deg, rough, planar, tight 174.73' - Fracture, horizontal, smooth, planar, tight 175.85' - Fracture, <5 deg, smooth,		_	SC-20 collected at 178.65- 179.45' -
-	R23-HQ 5 ft	52	1	undulating, clay infilling, silty clay infilling 176.3' - Fracture, <5 deg, rough, undulating 176.6-176.85' - Fracture zone, horizontal,		177.75-178.1' - moderate olive brown, (5Y 4/4), fine grained, no to mild HCl reaction, extremely weak	-
-	100%		3	smooth, planar, open 177.03' - Fracture, horizontal, smooth, planar, open 		<ul> <li>(R0), 1/16" voids over 10-15% of surface, 3/8"- 1-3/16" cavities, friable</li> <li>178.1-179.45' - yellowish gray, (5Y</li> </ul>	-
180 <u>-</u> -137.9 -	181.0		5	177.45, 177.6' - Fractures (2), horizontal, smooth, planar, open 178.4' - Fracture, <5 deg, rough, stepped, 3/8"-3/4" open		7/2), fine grained, mild to moderate HCl reaction, weak (R2), up to 1/16" voids over 10-15% of surface, 10-15% 3/8" to 1-3/16" cavities	R23: 4 minutes
-	-		3	179.0' - Fracture, <5 deg, smooth, stepped, brown silty clay infilling, 3/4"-1-3/16" open 179.25-179.43' - Fracture zone, <10 deg,		179.45-180.4' - pale yellowish brown, (10YR 6/2), fine grained, moderate to strong HCl reaction, weak to medium	
-			5	smooth, stepped, zone of soft friable rock fragments, inclined to horizontal, clay over 10-15%		strong (R2 to R3), voids over 1-2% of surface 180.4-184.80' - dusky yellow, (5Y	SC-21 collected at 184.8- 185.7' -
-	R24-HQ 5 ft 100%	66	3	179.85' - Fracture, <5 deg, smooth, stepped 180.0-180.3, 180.55-181.6' - Fractures (2), horizontal, smooth, planar 181.5' - Fracture, 70 deg, smooth, planar,		6/4), fine to very fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), voids over 10-15% of surface and increasing to 30-40%	-
- 185_ -142.9			2	tight - 181.8, 181.95' - Fractures (2), horizontal, smooth, planar, open		of surface and increasing to 30-40%  of surface below 183.5', thinly laminated at 182.2-182.4', trace  voids from 184.65-184.8'	R24: 5 minutes
-	-142.9 - - 186.0		1	182.1' - Fracture, <5 deg, smooth, stepped, open			_
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PROJECT NUMBER: BORING NUMBER: A-08

# **ROCK CORE LOG**

SHEET 11 OF 15

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 3.4	ft bgs	s on 03	3/22/07 START : 3/12/2007 END : 3/	21/20	D7 LOGGER : C. Wallestad, R. Gom	ez, R. McComb, L. Prochaska
<b>₹</b> □₽	(%			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 190 -147.9	R25-HQ 5 ft 100%	56	7 4 1 4	182.5' - Fracture, horizontal, rough, planar, open 182.7-183.02' - Fracture zone, horizontal, smooth, planar, open 183.3' - Fracture, horizontal, smooth, planar, open to tight 184.55' - Fracture, <5 deg, rough, undulating, rock fragments with dark brown clay filling 184.7' - Fracture, horizontal, rough, planar, open 185.5-185.7' - Fracture zone, <5 deg, rough, undulating, 1-3/16"-2" open 186.2, 186.35, 186.45' - Fractures (3), 0-<5 deg, rough, open to tight 186.64' - Fracture, horizontal, smooth, planar,		Limestone  184.8-186.5' - pale yellowish brown, (10YR 6/2), very fine to fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), fossil cavities up to 1-1/2"x1" over 60% of surface, voids up to3/16" over 40% of surface 186.5-187.7' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), 5-10% voids over surface, trace cavities, trace fossil molds, up to 40-50% voids at 186.7-186.8' and 186.9-187.05'	SC-22 collected at 187.0- 188.5' - - - - - R25: 9 minutes
- - - - 195 -152.9	R26-HQ 5 ft 100%	36	1 3 3 6 >10	open 186.78, 186.93, 187.0, 187.35, 187.6, 187.65, 187.7' - Fractures (7), 0 - <5 deg, rough, planar, open, vertical fracture at 187.35-187.6', tight 187.8' - Fracture, 70 deg, smooth, planar, tight 189.05' - Fracture, <5 deg, rough, planar, light brown sandy clay infilling, open 189.6, 189.7' - Fractures (2), horizontal, smooth, planar, open 189.9' - Fracture, <5 deg, rough, stepped to undulating 190.6' - Fracture, horizontal, rough, stepped to undulating, black organics over 90% of		187.7-187.73' - Same as 186.5-187.7' except 20-30% voids, 10-15% cavities 187.73-187.93' - light olive gray, (5Y 6/1), fine grained, thinly laminated 187.93-190.2' - yellowish gray, (5Y 5/2), fine grained, mild to moderate HCI reaction, weak (R2), voids over 60-70% of surface with discontinuous laminae with less voids 190.2-190.6' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, mild to moderate HCI reaction, very weak to weak (R1 to R2), dark wispy laminae, voids over	SC-23 collected at 191.0- 191.9' -
- - - - 200 -157.9	R27-HQ 5 ft 100%	50	1 2 2 10	surface 191.0' - Fracture, horizontal, smooth, planar, black coating over 100% of surface 191.6-191.9' - Fracture, 80 deg, rough, planar, open 191.9' - Fracture, <5 deg, rough, open, with stains 192.3, 192.4, 192.7' - Fractures (3), <5 deg, rough, undulating to stepped, open 193.25' - Fracture, <10 deg, smooth, planar to stepped, open 193.25-195.6' - Fracture zone, with low to high angle fractures, rock fragments 196.1' - Fracture, <5 deg, rough, stepped, open 198.5' - Fracture, horizontal, rough, stepped,		40-60% of surface 190.6-193.5' - yellowish gray to dark yellow, (5Y 7/2 to 5Y 6/4), fine grained, mild to moderate HCI reaction, very weak to weak (R1 to R2), voids over 50-60% of surface, cavities up to 3/4"x3/8" and up to 1-3/16" deep, voids becoming less common with depth 193.5-196.0' - grayish yellow, (5Y 8/4), fine to very fine grained, mild to moderate HCI reaction, very weak — (R1), voids over 20-30% of surface, 3-5% cavities, trace fossils, trace black organics 196.0-199.3' - yellowish gray, (5Y	SC-24 collected at 197.5- 198.5' - - - - R27: 10 minutes
- - - - 205 -162.9	R28-HQ 5 ft 100%	54	2 3 1 4	open 198.9' - Fracture, Horizontal, Hough, Stepped, open 198.9' - Fracture, <5 deg, rough, stepped, open 199.3-201.0' - Fracture zone, horizontal, smooth, open, becoming stepped and rough with depth 201.35' - Fracture, horizontal, rough, stepped, open 201.95' - Fracture, horizontal, smooth, planar, open 202.25' - Fracture, horizontal, rough, planar, open 202.35-202.5' - Fractures (2), horizontal, rough to smooth, stepped, open		196.0-199.5 - yellowish gray, (ST 7/2), fine grained, mild to moderate HCl reaction, very weak (R1), thinly laminated, trace voids filled with dark organic material, voids over 20-30% of surface, rare cavities, trace voids fossils 199.3-201.0' - yellowish gray, (5Y 7/2), fine to very fine grained, very weak (R1), voids on 3-5% of surface, trace black organic material as thin discontinuous laminae	SC-25 collected at 202.5- 203.5' - - - - - R28: 8 minutes



PROJECT NUMBER: BORING NUMBER:

338884.FL A-08

SHEET 12 OF 15

ORIENTATION: Vertical

### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724017.2 N, 457734.1 E (NAD83)

CORING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, HQ tools, HW casing

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER LEVELS: 3.4 ft bgs on 03/22/07 START: 3/12/2007 END: 3/21/2007 LOGGER: C. Wallestad, R. Gomez, R. McComb, L. Prochaska DISCONTINUITIES LITHOLOGY COMMENTS DEPTH BELOW SURFACE AND ELEVATION (#) CORE RUN, LENGTH, AND RECOVERY (%) 9 DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS 201.0-203.0' - Same as 199.3-201.0' 203.9' - Fracture, horizontal, rough, >10 undulating, open except with void/ cavity zone from 204.1, 204.25, 204.4, 204.5' - Fractures (4), 201.3-201.6' covering 20-30% of surface, very thin dark laminae at horizontal, rough, stepped, open 205.5' - Fracture, horizontal, rough, planar, 201.8' 3 Limestone open 203.0-207.65' - dusky yellow to moderate yellow, (5Y 6/4 to 5Y 7/6), 205.8' - Fracture, <5 deg, rough, stepped, R29-HQ 5 ft 76% 25 2 open 206.0-207.0' - Fracture zone, horizontal and fine to medium grained, mild to moderate HCl reaction, very weak to vertical, rough, abundant horizontal to vertical >10 fractures, open extremely weak (R1 to R0), voids 210 207.3, 207.75, 207.65' - Fractures (3), over 100% of surface except rare horizontal, rough, planar cavities from 205.1' to 205.5', some -167.9 R29: No runtime recorded NR 208.25, 208.7' - Fractures (2), horizontal, cavities are 3/8" to 3/4" deep smooth, planar, open 207.65-208.8' - yellowish gray, (5Y 211.0 208.7-209.8' - Fracture zone 211.0-212.3' - Fracture zone 7/2), very fine grained, mild HCl reaction, very weak (R1), >10 voids/cavities rare to absent 208.8-209.2' - fine grained, mild HCl >10 reaction, extremely weak (R0) 209.2-209.8' - light gray, (N7), fine grained, mild to moderate HCl R30-HQ reaction, very weak to weak (R1 to 0 5 ft 26% R2), only small gravel sized fragments, voids/cavities over NR 15-20% of surface up to 3/4" -1-3/16" length, 3/16" deep 215 No Recovery 209.8-211.0' -172.9 R30: 6 minutes Limestone 211.0-212.3' - yellowish gray, (5Y 216.0 7/2), mild to moderate HCl reaction, 216 0-218 45' - Fracture zone very weak (R1), voids/cavities over >10 30-40% of surface No Recovery 212.3-216.0' Limestone 216.0-218.45' - yellowish gray, (5Y >10 7/2), fine to medium grained, mild to R31-HQ moderate HCI reaction, extremely 13 5 ft 218.45' - Fracture, horizontal, rough, planar, weak (R0), voids/cavities over 49% open 20-30% of surface, trace fossils casts interbedded with soft friable NR limestone at 217.0-218.0' 220 No Recovery 218.45-221.0' -177 9 R31: 7 minutes 221.0 221.0-223.5' - Fracture zone Limestone 221.0-222.7' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, >10 221.7' - Fracture, horizontal, rough, stepped, very weak (R1), friable along thin laminae, voids/cavities over 10-30% 222.1' - Fracture, fractured gravel sized >10 of surface, trace fossils (casts/molds) limestone 222.7-223.5' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, R32-H0 8 5 ft 50% extremely weak to very weak (R0 to R1), voids on 1-3% of surface or NR No Recovery 223.5-226.0' 225 182.9 R32: 4 minutes 226.0



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-08

SHEET 13 OF 15

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 3.4	ft ba	s on 0	3/22/07 START : 3/12/2007 END : 3/2	21/20	07 LOGGER : C. Wallestad, R. Gon	nez. R. McComb. L. Prochaska
				DISCONTINUITIES		LITHOLOGY	COMMENTS
AND Z	, NND ≺ (%		S	DESCRIPTION	ŏ	ROCK TYPE, COLOR,	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_			>10	226.0-228.0' - Fracture zone, with some discernible fracture planes - 226.3' - Fracture, <5 deg, rough, stepped,	H	Limestone  - 226.0-228.0' - pale greenish yellow, (10Y 8/2), fine to very fine grained,	Stop drilling for the day 3/20/07 - Resume drilling at 08:40 on
-			>10	open 226.75, 226.95' - Fractures (2), horizontal, -		mild to moderate HCl reaction, very weak to weak (R1 to R2), voids over	3/21/07
-	R33-HQ 5 ft 40%	9		smooth, undulating, open 226.95' - Fracture, zone of rock fragments 227.35' - Fracture, horizontal, smooth, planar, open 227.5, 227.60' - Fractures (2), horizontal,		10-15% of surface, voids absent from 227.35-227.50'  No Recovery 228.0-231.0'	- - -
230 -187.9	231.0		NR	rough, planar, open 227.52' - Fracture, zone of rock fragments 227.9' - Fracture, horizontal, smooth, planar, open -		-	R33: 5 minutes
-	201.0		3	231.2' - Fracture, <5 deg, rough, undulating, open		Limestone  231.0-233.0' - yellowish gray to pale greenish yellow, (5Y 7/2 to 10Y 8/2),	-
_			3	231.9' - Fracture, horizontal, rough, stepped, open 232.0' - Fracture, 40 deg, rough, undulating,	Ė	fine grained, mild HCl reaction, very weak to extremely weak (R1 to R0), voids over 90% of rock	
_	R34-HQ 5 ft 40%	20		open 232.4' - Fracture, <5 deg, rough, undulating, tight		No Recovery 233.0-236.0'	-
235			NR	232.65' - Fracture, 25 deg, rough, undulating, tight 232.8' - Fracture, <5 deg, rough, undulating,		-	-
-192 <u>.9</u> -	236.0			open 1-3/16"-1-9/16"	H	-	R34: 5 minutes
-			>10	236.0-237.6' - Fracture zone, no bedding/fracture plane apparent, gravel sized limestone fragments up to 1-2" length		Limestone - 236.0-237.6' - Same as 231.0-233.0'	-
_				-		- - No Recovery 237.6-241.0'	-
-	R35-HQ 5 ft 32%	0	NR	-		-	-
240 -197.9				_		-  -	R35: 6 minutes
-	241.0		>10	241.0-242.6' - Fracture zone, gravel sized rock fragments, fracture plane uncertain -		Limestone - 241.0-242.6' - yellowish gray, (5Y 7/2), fine to very fine grained, mild	- -
_	Bae IIO			-		HCl reaction, extremely weak to very weak (R0 to R1), voids over 40% of rock, trace clay, trace fossil casts No Recovery 242.6-246.0'	-
-	R36-HQ 5 ft 32%	0	NR	- -			- -
245 -202.9 -	246.0			_		-	R36: 8 minutes
	2 <del>1</del> 0.0			-			



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 3.4	ft bgs	s on 03	3/22/07 START : 3/12/2007 END : 3/	21/20	07 LOGGER : C. Wallestad, R. Gor	nez, R. McComb, L. Prochaska
≥0 ≘	. 00			DISCONTINUITIES	စ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	T.H.	(%) Q	TUR 100-	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	] Society	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
TAN HE	ECC	ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	¥₩	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
Δош	Olk	ď	шФ	246.0-246.8' - Fracture zone, rock fragments	S	Limestone	
-			>10	240.0-240.0 - Fracture 20ne, rock fragments	Ë	- 246.0-247.6' - yellowish gray, (5Y	-
1 -				246.8' - Fracture, horizontal, rough, stepped,	世	7/2), fine grained, mild to moderate HCl reaction, very weak (R1), friable,	-
-			10	open 247.1' - Fracture, horizontal, rough, stepped,	$\vdash$	- thin laminae present in upper 0.5' of	-
	D07.110			tight -		interval, voids over 10-15% of surface, cavities up to 3/8" rare	-
	R37-HQ 5 ft	7		247.45' - Fracture, horizontal, rough, stepped, open		- No Recovery 247.6-251.0'	-
	32%			247.55' - Fracture, horizontal, smooth, planar	$\vdash$	- -	_
			NR	· -		<del>-</del>	_
250					Ľ	_	
-207 <u>.9</u> -				251.0-251.7' - Fracture zone, rock fragments	世	<u>-</u>	R37: 7 minutes
1 1	251.0			251.7' - Fracture, 60 deg, smooth, planar,	F		
			>10	open 252.2, 252.45' - Fractures (2), horizontal,	口	Limestone - 251.0-252.4' - yellowish gray, (5Y	
				rough, planar, open	丘	7/2), fine to medium grained, mild to	
			4	252.7, 252.75' - Fractures (2), <5 deg, rough, stepped to planar, open	┢	moderate HCl reaction, very weak (R1), friable	
			•	252.95' - Fracture, <5 deg, rough, undulating,	Ė	252.4-253.5' - yellowish gray, (5Y	
	R38-HQ 5 ft	45	4	tight 253.2' - Fracture, horizontal, smooth,	Ľ	7/2), very weak to weak (R1 to R2), very thinly laminated with lenses up	
	100%	70	_	stepped, open	╟	to 1/2", voids over 100% of surface,	
			3	253.6' - Fracture, horizontal, smooth, planar, open		slightly fossiliferous from 252.4-252.7, cavities up to 3/8" over	
255			3	253.75' - Fracture, <5 deg, stepped to planar,		10-20%	
-212.9			3	open 254.05' - Fracture, <5 deg, smooth,		253.5-256.4' - yellowish gray, (5Y – 7/2), fine grained, very weak (R1),	R38: 8 minutes
1 1	256.0		3	undulating, tight	Н	voids over 50-75% of surface,	
			>10	254.5' - Fracture, horizontal, rough, planar, open	F	cavities over 30%	
			- 10	254.55' - Fracture, horizontal, smooth, planar,		256.4-257.8' - Same as 253.5-256.4' except laminated, cavities over	
			10	open 254.95' - Fracture, rough, planar to		50-60% of surface, fossiliferous	
				undulating, tight	$oxed{\bot}$	- No Recovery 257.8-261.0'	
	R39-HQ 5 ft	0		255.5' - Fracture, 70 deg, rough, planar, open 255.7' - Fracture, rough, planar, open			
	36%	١		256.0-257.8' - Fracture zone, rough, planar,	Ш		
]			NR	fracture/joints horizontal to subhorizontal 261.0-261.4' - Fracture zone, rock fragments	Ь		]
260				261.4, 261.5' - Fractures (2), horizontal,	厂		]
-217.9				smooth, undulating, open 261.6' - Fracture, horizontal, rough,	片		R39: 6 minutes
]	261.0			undulating, open	片		1
1			<b>\10</b>	261.8' - Fracture, <5 deg, stepped, sand sized limestone infilling, open 3/4"-13/16"	$\vdash$	Limestone	1
1 7			>10	262.0' - Fracture, <5 deg, rough, undulating,	H	<ul> <li>261.0-263.8' - yellowish gray, (5Y 7/2), fine grained, mild to moderate</li> </ul>	1
1			10	rough 262.3' - Fracture, horizontal, rough, planar,	Ш	HCl reaction, very weak (R1), voids  over 50% of surface, very thinly	1
1			10	open	$\Box$	laminated at 263.3' (black organics),	1
1 1	R40-HQ		2	262.3-262.6' - Fracture zone, rock fragments 262.65' - Fracture, <5 deg, rough, stepped,	$\vdash$	some thin laminae at 261.4- 261.5'	1
1	5 ft 56%	8		open	1	No Bosovon, 262 9 266 0	1
1				263.0' - Fracture, <5 deg, smooth, planar, open		<ul> <li>No Recovery 263.8-266.0'</li> </ul>	1
265			NR	263.5' - Fracture, <5 deg, rough, stepped,	╨		1
-222.9			1411	open —	$\coprod$		R40: 6 minutes
1	266.0			-	仜		1
					1	Bottom of Boring at 266.0 ft bgs on	
						3/21/2007	



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724017.2 N, 457734.1 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DESCRIPTION  DESCR	Prochaska
End drilling on \total depth 266  Borehole collap overnight; unab open hole Water level at 3	ENTS
End drilling on \total depth 266  Borehole collap overnight; unab open hole Water level at 3	H OF CASING
End drilling on \total depth 266  Borehole collap overnight; unab open hole Water level at 3	RING RATE AND
End drilling on total depth 266  Borehole collapovernight; unatopen hole  Water level at 3	RESULTS, ETC.
Total depth 266  Borehole collaptovernight; unaltopen hole  Water level at 3	3/21/07
overnight; unat	"Z 1701',
overnight; unat open hole Water level at 3	sed to 38'
T I Water level at 3	le to re-
ground surface	.4' below
	-
	_
	-
1 1 1 1	
-	
	-
-	



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 3-7/8 tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 2.0 ft bo	s on 3/13	3/07 S	START : 3/13/2007 END : 3/22/2007 LOGGE	R:	T. Stewart
				STANDARD	SOIL DESCRIPTION	$\int_{0}^{\infty}$	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME LICOS OPOLID CVARDOL COLOD	$\exists$	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EPT URF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		INSTRUMENTATION
41.9				(14)		+	
-						1	1
-						1	Cathead Operator - Matthew Griffin
_						1	14:17 Water level at about 2' below ground
-						1	surface
						]	SS-1 (5.0-6.5') totally saturated (wet)
						]	
_						1	
_						1	1
5 36.9	5.0				Sand With Clay And Crayol (SD SC)	_	-
- 30.9		0.5	00.4	12-8-12	Sand With Clay And Gravel (SP-SC)  5.0-5.5' - light olive gray, (5Y 6/1), wet, medium	Æ	4
-		0.5	SS-1	(20)	dense, fine to medium grained, no HCl reaction, silica sand, 9% medium plastic fines, 20% fine to coarse	+	-
-	6.5				gravel	+	Driller's Remarks: Drill time: 4 minutes (6.5-
-						+	10.0')
-						1	1
-						1	1
_						1	1
-						1	1
10	10.0					1	1
31.9				405	Silt (ML) 10.0-10.7' - grayish orange, (10YR 7/4), wet, medium	I	Driller's Remarks: Hard drilling at 13', continued circulation loss
		0.7	SS-2	4-3-5 (8)	stiff, nonplastic, rapid dilatancy, moderate HCl	╬	Continued circulation loss
_	11.5			. ,	reaction, 5-10% very fine sand, trace fine sand-sized white particles, trace very fine brilliant green (5G 6/6)	1	_
-					sand-sized particles	4	-
_						4	-
-						+	-
-						+	
-						+	Driller's Remarks: Drill time: 4 minutes (10.0-
15	15.0					+	15.0') - 14:37 Driller's Remarks: Will insert 15' of 3"
26.9	15.0 15.4	0.1	SS-3	50/5	Limestone Fragments	丰	NW casing to seal off hole
-				(50/5")	\ 15.0-15.1' - grayish orange, (10YR 7/4), mild to moderate HCl reaction, friable with hand, 1/4-1/2"	1	Driller's Remarks: Now using a 4.5" tricone roller drill bit with NW rod to open up the hole
					sized discs; remainder are yellowish gray (5Y 5/1)	1	for 10' of 6" diameter casing
					angular fragments to 1/2", mild to moderate HCI reaction	1	15:45 Driller's Remarks: Hole is crooked with - 19' NWJ in ground; Adding 10' of 6" surface
]						1	casing to straighten hole 17:17 End of drilling for the day on 3/13/07
						]	with 20' of 6" in place
	18.5					1	_
				47-36-46		4	
-		1.5	SS-4	(82)		4	-
20	20.0					#	Щ
						_	



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 3-7/8 tri-cone bit ORIENTATION : Vertical

DRILLIN	G METH	OD AND	EQUIPMI	ENT : CME 550 S	N 186073, mud rotary, cathead, AWJ rods, 3-7/8 tri-cone bit		ORIENTATION : Vertical		
WATER	LEVELS	: 2.0 ft bo	gs on 3/1:	3/07	TART : 3/13/2007 END : 3/22/2007 LOGGE	R : T	Stewart		
I				STANDARD	SOIL DESCRIPTION	(5	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLICLOG			
BEL SE /		RECOVE	RY (ft)	.2011.200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	2	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND		
TH YFA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	MA	INSTRUMENTATION		
SUI			" <u> </u>	(N)	·	Š			
21.9 - - - -					Sandy Silt With Gravel (ML) 18.5-20.0" - very pale orange, (10YR 8/2), wet, hard, nonplastic, moderate HCl reaction, 30% fine to coarse sand, 15% limestone in disc-shaped gravel size pieces, all carbonate, trace fine to medium sand-sized white particles, trace brilliant green (5G 6/6) particles	- - - -	3/14/07; bottom of hole at 18.5' Will start sampling interval at 18.5' to 20.0' to avoid complicated footage counts No adapter available to reset drill rig run stroke 08:00 3/14/07 Water level is 1.8' below ground surface 09:22 03/14/07 start SPT at 18.5-20.0'		
-						1	Driller's Remarks: Drill time: 20 minutes		
-	23.5				Silty Sand (SM)	+++	T (20.0-23.5')		
25_ 16.9	25.0	1.2	SS-5	40-35-37 (72)	23.5-24.7' - dusky yellow, (5Y 6/4), wet, very dense, very fine to medium grained, moderate to strong HCl reaction, 30-35% nonplastic fines, trace white particles as laminae and fine to medium particles, trace fine to medium grained sized brilliant green	- - - -	09:57- Clean out mud tub from accumulated sandy cuttings, current borehole construction has 20' of 6" diameter casing, driller using N-rod (NWJ) to advance 4-1/2" tricone roller drill bit		
- - -					particles (5G 6/6); 23.75-24.0' limestone fragment, all carbonates	- - - -			
-	20 5					1	Driller's Remarks: Drill time: 19 minutes (25.0-28.5')		
-	28.5			36-50/4.5	Silty Sand With Gravel (SM)	1	<del>7</del>		
-	29.4	0.8	SS-6	(86/10.5")	28.5-29.3' - dusky yellow, (5Y 6/4), wet, very dense,		1		
					very fine to medium grained, moderate to strong HCI reaction, 20-30% nonplastic fines, 10-15%	$\top$	-		
30 11.9 - - - -					gravel-sized, poorly fossiliferous (casts) limestone fragments; trace fine black particles	- - - - -	- - - - -		
-						-	-		
-	22.5					1	Driller's Remarks: Drill time: 6 minutes (30.0-		
-	33.5 33.9	0.4	SS-7	50/5	Silty Sand With Gravel (SM)	1	33.5')		
35	23.0			(50/5")	33.5-33.9 - dusky yellow to light olive brown, (5Y 6/4 to 5Y 5/6), wet, very fine to coarse grained, moderate to strong HCl reaction, 20% nonplastic fines, 25% fine gravel, moderately fossiliferous (molds, casts,		- - -		
6.9					fragments), trace black inclusions, all carbonate	- - -	12:48 Start run from 35.0-38.5' - heavy chatter, 5-6 minutes to drill 1/2' - 13:16 Driller's Remarks: Maintaining circulation 14:04 End run from 35.0-38.5' (76 minutes) -		
	38.5					$\perp$			
	38.7	0.2	SS-8	50/2 (50/2")	Limestone Fragments 38.5-38.7' - light olive gray, (5Y 5/2), moderate HCl	╁	1		
-				(50/2)	reaction, coarse sand to fine gravel-sized fragments, poorly fossiliferous (casts), 15-20% fine black organic particles  Begin Rock Coring at 38.5 ft bgs	-	14:24 Driller's Remarks: Switch to rock coring, end of soil sampling at SS-8; approximately 38.5' below ground surface		
40					See the next sheet for the rock core log	1	1		
					-	†			



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, NW/HW casing

ORIENTATION: Vertical

CORING	3 METHOD A	ND E	QUIPN	ENT : CME 550 S/N 186073, mud rotary, NQ tools, NW/	HW c	asing	ORIENTATION : Vertical
WATER	LEVELS : 2.0	ft bg	s on 3/	13/07 START : 3/13/2007 END : 3/	22/20	07 LOGGER : T. Stewart	
				DISCONTINUITIES	ניו	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	38.5					Limestone	Start R1 at 15:50; 3 foot
40 1.9	R1-NQ 3 ft 87%	54	1 >10 1	39.5' - Bedding plane, horizontal, rough, undulating, tight — 39.6' - Bedding plane or mechanical break, horizontal, rough, undulating, tight 40.2-40.45' - Fracture zone, rock fragments		<ul> <li>38.5-41.1' - light olive gray, (5Y 5/2), fine grained, strong HCl reaction, very weak (R1), no fossils, moderate</li> <li>olive gray bedding (organics) across entire run up to 1/4-1/8" in thickness, trace of 1/16" voids</li> </ul>	run to set stroke Driller's Remarks: 20' of 6" HW casing and 40' of 3" NW casing is set  R1: 8 minutes
_	41.5		NR	up to 2-1/4"	$oldsymbol{\perp}$	No Recovery 41.1-41.5'	_
-			2	40.75' - Fracture, horizontal, rough, undulating, tight 41.5' - Bedding plane, horizontal, rough, planar, fine infill 1/8", tight 42.05, 42.25' - Mechanical break (2)		Limestone - 41.5-46.2' - light olive gray, (5Y 5/2), strong HCl reaction, weak to medium strong (R2 to R3), extremely weak - (R0) 44.0'-45.0', voids (1/8"x1/8")	Start R2 at 16:11
-	DO NO			42.65' - Fracture, 45 deg, rough, planar, tight	$\vdash$	over 25-40% of surface, poorly fossiliferous (casts), 25% of fine	-
-	R2-NQ - 5 ft 94%	62	0	44.0' - Fracture, horizontal, smooth, planar,		- grained black inclusions (organics)	Driller's Remarks: Very
45 -3.1	94 /0		>10	tight 44.2' - Bedding plane, horizontal, rough, undulating, top of extremely weak rock 44.95' - Bedding plane, horizontal, rough,		-  -	easy drilling over last 1/2'  New NQ core barrel: product shipping #370005154 new NQ drill
_	_		1	undulating		-	bit is a hard rock formation
_	46.5		NR	45.75' - Bedding plane or mechanical break, 5 deg, rough, undulating, tight	片	_ No Recovery 46.2-49.0'	drill bit serial #/product #: C36501
-	R3-NQ		NR	46.5' - Bedding plane, horizontal, smooth, planar, fines on surface, open		-	R2: 7 minutes Start R3 at 16:27
-	5 ft 50%	27	>10		Ш	Limestone	
50 -8.1			0		H	- 49.0-51.5' - Same as 41.5-46.2' except 49.0-49.1', 49.35-49.7'	_
-0.1	_				Ħ	extremely weak rock (R0), the rest of the interval is medium strong (R3) rock, fossil casts up to 3/8-1/4"	R3: 7 minutes
-	51.5		2	51.2' - Bedding plane or mechanical break,		_ 10ck, 10ssii casis up to 3/6-1/4	17:40 Driller's Remarks:
			0	horizontal, rough, undulating, tight 51.4' - Bedding plane or mechanical break,	H	51.5-56.5' - light olive gray, (5Y 5/2), strong HCl reaction, extremely weak	Bottom of hole is 51.5' Driller's Remarks: Core
-	-			horizontal, rough, undulating, open with 1/4" infill of fines	口	to medium strong (R0 to R3), voids up to 3/16"x3/16" over 30-40% of	loss probably from top (sandy interval) - Start R4 at 16:45
-	-		1	52.7' - Bedding plane, horizontal, smooth, undulating, tight	F	<ul> <li>surface, poorly fossiliferous (casts molds), organic laminae predominant</li> </ul>	Last core run for 3/14/07
	R4-NQ 5 ft	83	>10		$oxed{\mathbb{H}}$	from 52.7-53.1', 20%-30% fined grain black organic particles	Mottling in slightly darker hue over last 2',
-	100%	00			H	-	bioturbated zones, horizontally aligned over
55_ -13.1	-		0	<del>-</del>	片	_	last 2.0-2.5' of run R4-NQ
	]		1		Ħ	-	R4: 10 minutes
-	56.5			56.4' - Bedding plane, horizontal, rough,	E	-	Driller's Remarks: Bottom at 56.3' below ground -
-	1		3	undulating, fines on surface 56.8' - Bedding plane, horizontal, smooth,	世	-	surface 20' of 6" casing
-	1			undulating 57.0' - Bedding plane, <10 deg, smooth,	口	-	40' of 3" NW casing -
			3	undulating	Ш		_



FRACTURES PER FOOT

1

NR

NR

3

1

1

3

2

0

NR

2

>10

NR

2

1

3

>10

1/4-1/8'

planar, tight

open 1/4"

tight

RQD(%)

60 3

WATER LEVELS: 2.0 ft bgs on 3/13/07

CORE RUN, LENGTH, AND RECOVERY (%)

R5-NC

5 ft

R6-NQ

5 ft 78%

R7-NC

5 ft 72 1

80%

R8-NC

5 ft 38

66%

52 4

DEPTH BELOW SURFACE AND ELEVATION (ft)

60

-18.7

65

-23 T

70

-28.1

-33.1

61.5

66.5

<u>71</u>.5

76.5

PROJECT NUMBER: BORING NUMBER: 338884.FL A-09 SHEET 4 OF 11

#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW/HW casing

ORIENTATION: Vertical START: 3/13/2007 END: 3/22/2007 LOGGER: T. Stewart LITHOLOGY DISCONTINUITIES COMMENTS 90 DESCRIPTION ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD SYMBOLIC MINERALOGY, TEXTURE, WEATHERING, HARDNESS, DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS 57.2' - Bedding plane, horizontal, rough, 3/15/07 09:03 Limestone undulating, base of weakly indurated material 56.5-57.95' - light olive gray, (5Y Water Level = 1.15' below 5/2), strong HCl reaction, extremely ground surface 09:15 Start R5-NQ 57.65' - Fracture, 40 deg, rough, undulating, weak to weak (R0 to R2), tiny voids open 1/4 - 3/4" 57.85' - Fracture, horizontal, rough, up to 3/16"x3/16" covering 30-40% of Driller's Remarks: undulating, open 1/4-1/2" surface, poorly fossiliferous (cast, Maintained full circulation 57.95' - Bedding plane, horizontal, smooth, molds) contains several inches of R5: 12 minutes rock that can be indented with thumb. planar, open 1/4' 58.65, 59.0, 59.2' - Mechanical break (3) sharp bedding plane at 57.95 57.95-60.6' - light olive gray, (5Y 59.65' - Fracture, 45 deg, smooth, undulating, Start R6 at10:04 5/2), strong HCl reaction, weak to Driller's Remarks: Probably medium strong (R2 to R3), tiny loss of core at beginning of (<1/16") voids over 10-15% of 62.75' - Fracture, horizontal, smooth, surface, trace cavities with undulating, base of weakly indurated section, secondary mineral infill up to 3/4"x1/2" elliptical shape, entire 62.85' - Bedding plane or mechanical break, section mottled, trace black fine to horizontal, rough, planar medium particles 63.4' - Bedding plane or mechanical break, No Recovery 60.6-62.6' <10 deg, rough, planar 63.8' - Bedding plane or mechanical break, Limestone 62.6-63.5' - light olive gray, (5Y 5/2), fine to medium grained, moderate to horizontal, rough, undulating, black staining, tight to open 1/4" R6: 6 minutes strong HCl reaction, extremely weak to very weak (R0 to R1), crumbles 64.0' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/4-1/2" under thumb pressure, silt with Start run R7-NQ at 10:26 64.4' - Bedding plane or mechanical break, organic laminations horizontal, rough, undulating, tight 64.55' - Bedding plane or mechanical break, 63.5-64.5' - light olive gray, (5Y 5/2), fine to medium grained, moderate to horizontal, rough, planar, tight strong HCI reaction, extremely weak 65.1' - Mechanical break to very weak (R0 to R1), up to 20% 65.4' - Bedding plane, horizontal, rough, of rock has cavities up to 4" long 64.5-66.5' - light olive gray, (5Y 5/2), fine to medium grained, moderate to strong HCl reaction, extremely weak 65.95' - Fracture, 15 deg, rough, undulating, to very weak (R0 to R1), tiny voids up to 1/16"x1/8" over 25% of surface, 66.6' - Mechanical break 66.95' - Fracture, 25 deg, rough, undulating, 15-20% medium coarse sized tight 67.7. 67.95' - Fractures or mechanical break R7: 13 minutes grayish black inclusions, grayish Last core run on 3/15/07 (2), horizontal, rough, planar, open 1/4-1/2" staining on surface 66.5-70.5' - light olive gray, (5Y 5/2), 20' of 6" diameter casing 69.0' - Bedding plane, horizontal, smooth, 40' of 3" diameter NW planar, 1/4" fine infill 69.5, 70.1' - Mechanical break (2) moderate to strong HCl reaction, casing weak to medium strong (R2 to R3), Bottom hole depth at 71.6' 72.1' - Fracture or mechanical break, 50 deg, poorly fossiliferous (casts), tiny voids 13:20 3/20/07 Measured smooth, undulating, tight up to 3/16"x3/16" covering 20-30% of water level at 0.2' below 72.4' - Fracture, 90-80 deg, rough, surface, trace cavities with ground surface; bottom of undulating, gray staining, tight secondary mineral infill up to hole at 71.5' 72.75' - Mechanical break or fracture, 70 deg, 2-1/2"-3/4", 1" thick carbonate silt Driller's Remarks: Soft layer at 67.5', gradual change from rough, undulating, open 1/4-3/4 drilling from 72.5-75.0' very fine to fine grained, medium to fine grained from 62.3-68.0', 67.3' 74.7' - Bedding plane, <10 deg, bottom of 13:45 Start run R8-NQ; has black wavy staining
No Recovery 70.5-71.5 core loss zone 100% circulation loss over 74.85' - Bedding plane or mechanical break, core run smooth, planar, tight End run at approximately 14:10 76.2' - Fracture, 70 deg, slickensided, undulating, black staining, tight
76.55, 76.7' - Bedding plane or mechanical Driller's Remarks: Running in 3rd gear, will mix a denser mud for next run break, horizontal, slickensided, planar, open R8: 22 minutes 14:25 Start run 76.85' - Fracture, 70 deg, rough, undulating,



PROJECT NUMBER:

33884.FL

BORING NUMBER:

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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW/HW casing

WATER	LEVELS : 2.0	ft bgs	s on 3	/13/07 START : 3/13/2007 END : 3/	22/20	07 LOGGER : T. Stewart	
>00	(6			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	5010	ROCK TYPE, COLOR,	SIZE AND DEDTH OF CASINO
불병은	P.H.A.	(%) O	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
THE AND	NG COO	σ	AC]	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SS	SC LE RE	Š.	HR PE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥ	CHARACTERISTICS	DROFS, TEST RESULTS, ETG.
	R9-NQ	00	4	78.0' - Bedding plane, horizontal, sharp	Ш	Limestone	
_	5 ft 94%	63	1	contact also showing mottling of rock 78.2-75.5' - Fracture zone, irregular shaped	世	<ul> <li>71.5-73.0' - yellowish gray to light olive brown, (5Y 2/2 to 5Y 5/6),</li> </ul>	1
80				cavities infilled with medium coarse grained	┰	strong HCl reaction, very weak to	1
-38.1			1	infill, infill of medium gray (N5) —	亡	— medium strong (R1 to R3), elongated	<u> </u>
-				79.05' - Bedding plane, horizontal, rough, undulating, open up to 3/4"	╁	voids up to 3/16"x1/16" over 25-30% of surface, very irregular shaped	R9: 16 minutes
-			>10	80.35' - Bedding plane or mechanical break,	╨	<ul> <li>cavities up to 3/4"x1-1/4" filled with</li> </ul>	14:42 End run
-	81.5		NR	rough, undulating, tight, open up to 1/8" 80.8-81.2' - Fracture zone, 1-1/4"-1/4"	╁╌	carbonate silt bearing medium to coarse grained, gray inclusions or	Driller's Remarks: Soft -
_			>10	limestone fragments	F	- infill, poorly fossiliferous (molds)	near bottom of run at 81',
_				81.5-82.2' - Fracture zone		No Recovery 73.0-74.7'	will advance 3" NW casing to 80' due to continued -
			4	82.7' - Fracture, 50 deg, rough, undulating,	Щ	74.7-76.5' - Šame as 71.5-73.0' - except very weak (R1) rock and	circulation loss
			1	tight, brownish black staining	世	yellowish gray (5Y 7/2) from	Assumed core loss from
_	R10-NQ				+	74.7-74.85', more dense and more	end of run – SC 1 collected at 81.6-
-	5 ft 92%	67	0		亡	fossiliferous from 74.85-76.5'     Limestone	82.45'
-	9270				₩	76.5-81.2' - moderate yellowish	Driller's Remarks: -
-43.1			1	_	世	brown to dusky yellow, (10YR 5/4 to	Continued circulation loss during 3" NW casing
-				85.3-85.6' - Fracture zone	╁┯	5Y 6/4), moderate to strong HCl reaction, medium strong (R3),	advancement, soft at 81.5
_			1			mottled very pale orange (10YR 8/2)	84' R10: 9 minutes
_	86.5		NR			and medium gray (N5) over 78.2-78.7', tiny (1/16"x1/16") voids on	_
			>10	86.8-87.4' - Fracture zone, yellowish gray		25-35% of surface, irregular shaped	09:12 Start R11-NQ
			/10	carbonate silts and up to 1-1/2" subrounded		cavities 15-20% with secondary	1
_			>10	limestone fragments	Ъ	mineral infill, poorly fossiliferous (molds), trace organics as 1/2" long	1
-			/10			horizontally aligned inclusions, 10-15	Core loss assumed from
-	R11-NQ 4.5 ft				╁┷	deg bedding plane at 78.0', wavy	88.1 to 90.8' (2.7 ft core -
-	40%	Ū			╨	carbonate silt and organic laminae at 80.0', gray staining from 80.4-81.2'	loss)
-			NR		+	No Recovery 81.2-81.5'	-
90 <u> </u>				_	+	Limestone 81.5-86.1' - moderate yellowish	
-40.1					上	brown, (10YR 5/4), fine to medium	R11: 14 minutes
_	91.0				╨	grained, strong HCl reaction,	
_	R12-NQ 91.5, 0.5 ft	100	1	91.2' - Fracture, vertical, smooth, undulating,	Д	medium strong (R3), voids up to - 3/16"x3/16" over 35-45% of surface,	Driller's Remarks: Very hard drilling at 91.0', driller -
	100%/			black staining, tight (runs from 90.8-91.5')	$\vdash$	elliptical 1/2"x1/2" shaped cavities,	pulled out of hole because
			2	92.1' - Fracture, horizontal, smooth, stepped,		moderately fossiliferous (casts),	he thought the core barrell
				tight	Ľ	<ul> <li>subangular to subrounded inclusions of yellowish gray (5Y 8/1) carbonate</li> </ul>	was not spinning; another - core run will be made to
-			3	92.35' - Bedding plane, horizontal, smooth, undulating, 1/2" thick organic infill	╨	silt clasts from 1/8"-2"x2"	get the remaining 1/2 foot
-	R13-NQ			92.55' - Fracture, 80 deg, rough, undulating,	世	- No Recovery 86.1-86.5'	The 6" core run will be -
-	5 ft	0	3	tight	╁	Limestone 86.5-88.3' - medium olive brown, (5Y	R12-NQ R12: 3 minutes
-	100%			92.85' - Fracture, 70-80 deg, rough, undulating, tight	#	<ul> <li>4/4), strong HCl reaction, very weak</li> </ul>	Start R13 at 09:52 -
95_ -53.1			2	93.0' - Fracture, 70-80 deg, rough,	╨	to medium strong (R1 to R3), voids up to 1/16" over 35-40% of surface;	-
-53.1				undulating, tight 93.2' - Bedding plane or mechanical break,	耳	<ul> <li>carbonate silts (yellowish gray) at</li> </ul>	<u>                                     </u>
_			1	horizontal, rough, undulating	上	87.0'; at 87.8' medium olive brown,	R13: 14 minutes
	96.5		'	93.4, 93.5, 93.6' - Fractures (3), horizontal,	H	moderately fossiliferous (casts), black medium grained inclusions	]
			,	rough, undulating, tight 93.5' - Fracture, 60-75 deg, rough, undulating		No Recovery 88.3-91.0'	]
_			1	93.75' - Bedding plane, horizontal, smooth,	屽	Limestone	1
I -				planar, <1/8" organic infill	世	91.0-91.5' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction,	
-			1	94.5' - Bedding plane or mechanical break, horizontal, rough, undulating, tight	╁	medium strong (R3), trace voids,	-
				, ,	F	trace black wavy laminations (>1/16")	
1	l				1		ı

ORIENTATION: Vertical



PROJECT NUMBER:

33884.FL

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW/HW casing

WATER	LEVELS: 2.0	ft bgs	on 3	/13/07 START : 3/13/2007 END : 3/	22/20	07 LOGGER : T. Stewart	
<b>₹</b> □ ⊊	(%			DISCONTINUITIES	ည်	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-58.1	R14-NQ 5 ft 100%		0 1	95.1' - Fracture, 40-50 deg, rough, undulating, tight 95.5' - Fracture, 40-50 deg, rough, undulating, tight 97.85' - Fracture, 45-55 deg, rough, undulating, tight 98.9' - Fracture, 55-65 deg, rough, undulating, tight		91.5-93.75' - Same as 90.8-91.5' - except organic interval 1/2" thick at 92.4' gradational change from 93.45' to 93.75' - 93.75-96.5' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, medium strong (R3), tiny (1/16"x1/16") voids over 35-40% of	R14: 8 minutes Continued circulation loss
- - - -	101.5 R15-NQ	53	1	100.55' - Fracture or mechanical break, rough, undulating, tight 101.7' - Fracture, 40-50 deg, rough, undulating, tight 102.1' - Fracture, 40-50 deg, rough, undulating, tight		surface, up to 25% organic laminations concentrated from 93.8-94.7', highly fossiliferous (shells/casts) up to 1-1/2" fragments, up to 5% medium grained gray (N5) particles 96.5-101.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCI reaction, very weak (R1), highly	SC-2 collected at 100.55- 101.5' - - -
- 105 -63.1 - - -	100%		1 >10	104.35' - Fracture, 40-50 deg, rough, undulating, tight 104.8' - Fracture or mechanical break, horizontal, rough, undulating, tight 105.4-106.5' - Fracture zone		fossiliferous (molds, casts, fragments), trace organics (soft) up to 1-1/2" square fragments, apparent bedding, fossil fragments up to 1/2", few whole spherical fossils, rock has a chalk like appearance 101.5-106.5' - Same as 96.5-101.5' except densely bedded	R15: 8 minutes -
- - - - 110	R16-NQ 5 ft 100%	93	1 0 0	106.7' - Bedding plane or mechanical break, horizontal, rough, undulating, tight to open 1/8" 107.75' - Fracture, 70-80 deg, rough, undulating, tight		106.5-111.5' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCI reaction, very weak (R1), tiny spherical voids up to 1/16"x1/16" over up to 15% of surface, poorly fossiliferous (casts), trace cavities up to 1/4"x1/4", medium grained white and gray particles up to 35% in matrix	R16-NQ has similar "chalk like" appearance to R15-NQ, but no apparent bedding -
-68. <u>1</u> - -	111.5		1	111.4' - Fracture or mechanical break, 40-50		- 444 5 446 41	R16: 10 minutes
- - - -	R17-NQ 5 ft	97	0 0	deg, rough, undulating, tight		111.5-116.4' - Same as 106.5-111.5' - except at 114.6-116.4' elongated cavities rimmed with a secondary mineralization infill of the same color as the matrix, medium to coarse grained medium gray (N5) inclusions over 30-40% of surface, wavy bedding 1/4" thick near base (about 116.2")	13:29 Start run R17
- 115 -73.1 - -	98%		2 0 NR	114.75' - Fracture or mechanical break, 50-60 deg, rough, undulating, open 1/8-1/4" 115.0' - Bedding plane or mechanical break, horizontal, slickensided, undulating, open 1/4"		116.2')  - - - No Recovery 116.4-116.5'	SC 3 collected at 114.0- 114.8' — R17: 6 minutes — 13:55 Start run R18
- - -			2	116.65' - Fracture or mechanical break, rough, undulating, open 1/8-1/4"  117.45' - Fracture or mechanical break, 20-30 deg, rough, undulating, open 1/4"		-	Driller's Remarks: Soft drilling from 116.5-119.5'; medium drilling at 119.5-121.5'

ORIENTATION : Vertical



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-09

SHEET 7 OF 11

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW/HW casing

WATER	LEVELS : 2.0	ft bg	s on 3		22/20	07 LOGGER : T. Stewart	
≥o⊋	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
FACE	E RL 3TH, OVEI	(%) Q	FOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP' SURI ELE	COR	RQI	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	R18-NQ			118.55' - Fracture, <10 deg, rough,	ш	Limestone	SC 4 collected at 117.5-
-	5 ft 100%	82	3	undulating, tight 119.0' - Mechanical break	╁	<ul> <li>116.5-121.5' - very pale orange (10YR 8/2) from 116.5-119.8' and</li> </ul>	118.6'
120	10070			119.0 - Mechanical break 119.2' - Fracture or mechanical break,	H	yellowish gray (5Y 8/1) from	-
-78.1			3	horizontal, rough, planar, tight 119.35' - Bedding plane or mechanical break,	Ħ	<ul> <li>119.8-121.5', fine to medium grained, strong HCl reaction, weak (R2), very</li> </ul>	_
-				horizontal, rough, planar, open 1/8-1/4"	H	fine well rounded grains, moderately	R18: 5 minutes
-	121.5		3	121.05, 121.2' - Bedding plane or mechanical	H	<ul> <li>to highly fossiliferous (casts, molds), gray staining from 116.5-117.0', trace</li> </ul>	-
_			4	break (2), horizontal, rough, undulating, open 1/4-1/8"	Н	elliptical cavities (1/2"x1/8") rimmed	-
_			1	121.45' - Fracture, 40-50 deg, black staining,	Н	<ul> <li>with opaque secondary mineralization in center, coarse</li> </ul>	-
_			1	tight 121.6' - Fracture or mechanical break, rough,	Ш	appearance of rock due to micro fossils, rock has a "chalk like" feel	-
			'	planar, tight	Ш	121.5-126.3' - yellowish gray, (5Y	
]	R19-NQ 5 ft	43	3	122.2' - Fracture, 30 deg, rough, planar, brownish black staining, open 1/8"	Щ	8/1), fine grained, strong HCl reaction, weak (R2), tiny voids	]
_	96%	40	٥	122.5' - Fracture or bedding plane, 20 deg, open 1/8-1/4"	Н	(<1/16") up to 20% of surface, trace	_
125_			1	122.55, 123.5' - Fracture (2), horizontal,	H	elliptical cavities rimmed with white secondary mineralization, poorly	
-83.1			·	rough, planar, tight 123.9' - Fracture, horizontal, rough,	F	fossiliferous (casts, few molds), trace organics as very fine discontinuous	
_			3	undulating, open 1/8"	H	_ laminations (<1/16"), 5-15% fine to	R19: 7 minutes
-	126.5		NR	124.2' - Bedding plane or mechanical break, horizontal, smooth, planar, open 1/8" -	H	medium grained, medium gray (N5) particles	
_			3	124.55, 124.65' - Bedding plane or mechanical break (2), horizontal, smooth,	Н	No Recovery 126.3-126.5'	100% loss of circulation continues
-				undulating, open 1/8"	⊬	<b>Limestone</b> - 126.5-131.3' - yellowish gray (5Y 7/2)	-
-			2	125.25' - Bedding plane or mechanical break, horizontal, smooth, planar, open 1/8"	H	from 126.5-129.7' and yellowish gray (5Y 8/1) from 129.7-131.25', strong	-
-	R20-NQ			125.55' - Bedding plane or mechanical break,	囯	HCl reaction, weak (R2), moderately	-
-	5 ft	53	2	horizontal, smooth, undulating, open 1/8-1/4" 125.8, 125.95' - Bedding plane or mechanical	団	to highly fossiliferous (casts, molds, microforams), black staining on rock	-
-	96%			break (2), horizontal, rough, undulating, open - 1/8-1/4"	世	surface, 15-20% fine grained	-
130 <u>-</u> -88.1			>10	126.65' - Mechanical break or bedding plane,		medium gray (N5) particles, very thinly bedded from 128.5-129.5'	_
-			_	horizontal, smooth, planar, tight 127.2' - Bedding plane, <10 deg, rough,	H	-	R20: 8 minutes
-	121 5		2	undulating, tight	Ħ	-	-
-	131.5		NR.	127.45' - Bedding plane or mechanical break, horizontal, rough, undulating, brown staining,	Ħ	<ul> <li>No Recovery 131.3-131.5'</li> <li>Limestone</li> </ul>	Start R21 at 14:42
-			5	open 1/2"	H	131.5-134.1' - fine to medium	SC-5 collected at 135.70-
-				127.95' - Fracture, <10 deg, rough, undulating, open 1/4"	oxdot	<ul> <li>grained, strong HCl reaction, very weak (R1), bedding up to 1/2" thick,</li> </ul>	136.50'
-			5	128.15' - Mechanical break or fracture, horizontal, smooth, planar, tight	Н	20% fine grained medium gray	-
-	R21-NQ			128.8' - Bedding plane, horizontal, rough,	H	– inclusions	
-	5 ft 100%	63	4	planar, tight 129.1, 129.13' - Bedding plane (2),	ш	134.1-136.5' - fine to medium	-
135	]			horizontal, rough, planar, tight	Ш	grained, strong HCl reaction, very weak (R1), moderately fossiliferous	-
-93.1	]		0	129.65' - Bedding plane, horizontal, rough, — planar, open 1/4"	$\Box$	(molds, casts), disconformity at	_
]	]		0	129.8' - Bedding plane, horizontal, rough, undulating, open 1/2-3/4"	Н	134.25'; 136.3-136.5' beds dipping at 7 deg, trace voids with calcite infill up	R21: 10 minutes
	136.5		J	130.15' - Bedding plane, horizontal, rough,	F	to 1/6"x1/16" (white infill color), rock	
			3	planar, open 1/2-3/4" 130.15-130.4' - Fracture zone, up to 1/2" core	Ħ	color is alternating, laminated to thinly bedded yellowish gray (5Y 7/2)	Continued circulation loss
_	]			fragments, brownish black staining on	H	to light olive gray (5Y 5/2) from 131.5-134.25', then yellowish gray	
_	]		>10	fracture surface 130.75, 130.9' - Bedding plane or mechanical	H	(5Y 7/2) to the end of core run	
			- 10	break, rough, undulating, open 1/4-3/8"	H		

ORIENTATION: Vertical



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-09

SHEET 8 OF 11

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW/HW casing

WATER	LEVELS : 2.0	ft bgs	s on 3/	13/07 START: 3/13/2007 END:	3/22/20	07 LOGGER : T. Stewart	
>00	(9)			DISCONTINUITIES	ტ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		SII	DESCRIPTION	Š SYMBOLIC LOG	ROCK TYPE, COLOR,	OLZE AND DEDTH OF GAGING
불병론	RUN H. A	(%) Q	FRACTURES PER FOOT	DEDTIL TYPE OPIENTATION POLICUNICO		MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F X X	ZOV	0	SCT F	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	₩ W	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
	COF	S O	FR/ PEF	THICKNESS, SURFACE STAINING, AND TIGHTNESS	s X	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	R22-NQ			131.55' - Bedding plane, horizontal, smooth,	$\dashv$	Limestone	
-	5 ft	57	>10	undulating, tight	-	<ul> <li>136.5-138.3' - dusky yellow, (5Y 6/4),</li> </ul>	-
_	90%			131.75, 131.8' - Bedding plane or mechanical	┵	fine grained, strong HCl reaction, tiny	<b>l</b> -
140			<b>,</b>	break, horizontal, smooth, planar, tight		voids up to 1/16" (spheroidal) over 10% of surface, cavities up to 1/2"x1"	
-98.1			4	132.15, 132.25, 132.55, 133.1' - Bedding plane or mechanical break (4), horizontal,	$\neg$	elongated and infilled with white	
-			1	rough, smooth, planar, tight	+-	minerals and medium gray	R22: 12 minutes
-				133.3-133.4' - Fracture zone		<ul> <li>secondary minerals, up to 15%</li> </ul>	-
_	141.5		NR	133.45, 133.65, 133.75, 134.0, 134.1' -	4	medium grained, medium gray	_
			>10	Bedding plane or mechanical break (5), horizontal, rough to smooth, planar, tight		particles, dipping wavy laminations near 138.0'	_
_			710	136.6, 136.7' - Bedding plane or mechanical	74	138.3-139.6' - yellowish gray, (5Y	_
-				break, horizontal, rough, planar, tight	1	7/2), very fine grained, strong HCl	-
_			0	137.2' - Fracture, horizontal, rough, planar,	-	<ul> <li>reaction, strong (R4), moderately</li> </ul>	-
_				open 1/4"	┵	fossiliferous (casts, molds), trace tiny	-
	R23-NQ	82	2	137.65' - Fracture, horizontal, rough, undulating, open 1/8"		voids, reflective very fine grains inside cavities and on broken	
	5 ft 92%	02		138.3-138.85' - Fracture zone, 1"-1-1/2"	1	surfaces, fossils up to 3/4"	
145	5270			subrounded fragments	+-	139.6-141.0' - light olive gray, (5Y	-
145_ -103.1			0	139.4' - Fracture or mechanical break,	$-\Box$	5/2), strong HCl reaction, strong	_
-				horizontal, rough, undulating, tight, (R5) 139.6' - Fracture, horizontal, rough,	+	(R4), short (about 3/8") discontinuous vertical stress	
_			0	undulating, open 1/2-3/4", orange staining		_ fractures, orange staining, irregular	R23: 9 minutes Circulation loss (100%)
	146.5		NR	140.0' - Fracture, horizontal, rough,	$\perp$	shaped cavities up to 1-1/2"	has continues
-	110.0			undulating, black staining, open 1/8"	1	No Recovery 141.0-141.5'	About 75-100% water loss
-			2	140.3' - Fracture or mechanical break, horizontal, rough, planar, open 1/8"	-	Limestone 141.5-144.0' - very light gray, (N8),	during run, 1/4 bag, quick -
_				140.4' - Fracture, 20-30 deg, rough,	+	mild to strong HCl reaction, weak to	gel in bentonite added to
_			2	undulating, open 1/4-1/2"		medium strong (R2 to R3), thinly	mud Powdery, "chalk like" feel -
				140.9' - Fracture, horizontal, rough,	$\vdash$	bedded to laminated, voids up to	over upper interval,
_	R24-NQ			undulating, open 1/2-1" 141.5-141.65' - Fracture zone, subangular		1/16" diameter over 10% of surface, with very weak (R1) zones that are	translucent secondary
-	5 ft	68	0	fragments up to 3/4"	+1	fractured, trace cavities up to 1/2"	mineralization in center, -
-	88%			141.85' - Bedding plane or mechanical break,	+	diameter, organic content in very	coarse appearance of rock due to microfossils
150			>10	horizontal		weak zones of rock 143.96-144.0',	——————————————————————————————————————
-108.1			. •	143.85' - Bedding plane or mechanical break, horizontal, rough, planar, open 1/4"	┵	organic odor - 144.0-146.1' - yellowish gray, (5Y	_
_			>10	143.95' - Fracture, 60-70 deg, rough,		8/1), strong HCl reaction, chalk	R24: 6 minutes
_	454.5		NR	undulating, black staining, open	1-	like/powdery feel, horizontally	I -
-	151.5			146.65, 146.8, 148.4, 148.35' - Bedding plane	+	<ul> <li>bedded, white and yellowish gray</li> </ul>	Start at 16:05 added more
-			2	or mechanical break (4), horizontal, rough,	$\Box$	matrix, texture gradually changes from medium to fine grained	quick gel.
I -				planar, tight 149' - Mechanical break		downward with depth	Circulation loss (mud was
			[	150.1' - Fracture, 80 deg, rough, undulating,		No Recovery 146.1-146.5'	mixed as above)
1 -			3	tight	1	Limestone	1
-	R25-NQ		$\vdash \vdash$	150.25' - Mechanical break or fracture,	世	146.5-148.6' - yellowish gray, (5Y	-
-	5 ft	73	1	horizontal, open 1/4" 150.45-150.9' - Fracture zone, 1-1/2"	+-	1/2), mottled in Hue 5Y colors, thinly bedded	-
I -	80%			fragments	1	_ 148.6-150.9' - light olive gray, (5Y	<b>l</b> -
155			1	151.55, 151.65' - Bedding plane (2),		5/2), very fine grained, moderate to	
-113.1			' <b> </b>	horizontal, rough, undulating, tight, organics	$\neg$	strong HCl reaction, weak to medium	
I -			$\vdash$	on fracture surfaces 152.75, 152.85' - Fracture (2), horizontal,	#	strong (R2 to R3), powdery/"chalk like" feel over upper interval, dense	R25: 7 minutes
-			NR	rough, undulating, open 1/8-1/4"	+	limestone mottled with gray stains	-
-	156.5		$\Box$	152.85' - Fracture, horizontal, rough,	$\perp$	over lower interval, elongated cavity	-
l -			1	undulating, open 1/4"		2" long at 150.0', no infill	1 .
			' <b> </b>	154.1' - Bedding plane or mechanical break 155.05' - Bedding plane, 7 deg, smooth,	-	No Recovery 150.9-151.5'	1
I -			1	planar, open 1/4"	$\perp$	Ī	1
-				156.8' - Bedding plane, horizontal	+	t	-
			$\vdash \vdash$				-
1					ı		

ORIENTATION : Vertical



FRACTURES PER FOOT

NR

NR

N/A

>10

>10

0

3

4

0

>10

2

4

5

5

3

NR

>10

0

42

RQD(%)

10

WATER LEVELS: 2.0 ft bgs on 3/13/07

CORE RUN, LENGTH, AND RECOVERY (%)

R26-NQ

5 ft

28%

R27-NQ

4.5 ft 73% 7

R28-NQ

5 ft 50 >10

100%

R29-NQ

5 ft

98%

R30-NQ

161.5

166.0

171.0

176.0

DEPTH BELOW SURFACE AND ELEVATION (ft)

160

-118<del>.1</del>

165

-123 1

170

-128.1

175

-133.1

BORING NUMBER: PROJECT NUMBER: 338884.FL A-09 SHEET 9 OF 11

#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW/HW casing START: 3/13/2007

DESCRIPTION

DISCONTINUITIES

157.8' - Fracture, 70-80 deg, rough,

166.3, 166.4, 166.65' - Bedding plane (3),

horizontal, rough, undulating, organic infill

170.02' - Bedding plane, horizontal, rough,

170.78' - Bedding plane, horizontal, rough,

break, horizontal, rough, undulating, tight 172.1' - Fracture, 70-80 deg, rough,

undulating, tight 172.32' - Fracture, 70-80 deg, rough,

172.4' - Fracture or mechanical break,

172.55' - Bedding plane, <10 deg, rough,

173.08' - Bedding plane, horizontal, rough,

173.35' - Bedding plane, horizontal, rough,

horizontal, rough, undulating, tight

170.07-170.4' - Fracture zone, organic

(4), horizontal, smooth, planar, tight

168.98-169.33' - Fracture zone

undulating, organic infill 1/16"

<10 deg, rough, undulating, tight

laminated rock

undulating, tight

undulating, tight

planar, open 1/8

undulating, open 1/8"

undulating, open 1/8"

undulating, black staining, tight

ORIENTATION: Vertical END: 3/22/2007 LOGGER: T. Stewart LITHOLOGY COMMENTS 90 ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD SYMBOLIC DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS Last core run of 3/21/07 Limestone 151.5-155.5' - Same as 148.6-150.9' 80' of 3" NW in hole 20' of 6" casing in hole except thinly bedded to laminated Driller's Remarks: Expects 151.5-152.8' and 154.0-155.0' light to be in void space from olive gray, (5Y 5/2), moderate to strong HCl reaction, organic approximately 158.0' down (possible karst/cavity) laminations, gray staining of rock at Rock has "chalk like" 152.8', 5-10% cavities up to 3/4' texture spherical and infilled with white R26: 2 minutes 08:16 Begin drilling on minerals, trace up to 10% shell 3/22/07- water level 1.5' fragments, black wavy laminae (organic) at base of core, gradually below ground surface changes texture twice from coarse to 08:44 Štart R27-NQ; fine grained with depth bottom of hole at 160.7' No Recovery 155.5-156.5' Driller's Remarks: Still no Limestone circulation 156.5-157.9' - yellowish gray, (5Y Driller's Remarks: Run is 8/1), fine grained, strong HCI 0.5' short, he can feel the voids (micro forams) up to 20-30%, trace of elongated cavities, rimmed loose material from the above void that is apparently lodged at top of with secondary mineralization, up to 10% fine grained orange and black run and is not allowing for further advancement particles R27-NQ is a 4.5' run. Sand No Recovery 157.9-162.7' is observed around the Carbonate Silty Sand With Gravel pulled core; hole tagged 167.1, 167.5, 167.7, 167.93' - Bedding plane bottom at 166.0' 162.7-163.4' - medium gray to Driller's Remarks: Mixes a thick batch of mud medium dark gray, (N5 to N4), wet, R27: 13 minutes nonplastic, strong HCl reaction, Driller's Remarks: Steady 30-40% very fine to fine black drilling through run, particles, gravel-sized fossil fragments up to 1/2" diameter continued circulation loss (100%), mix 1/4 bag Limestone Fragments bentonite to mud tub 163.4-164.0' - angular limestone R28: 5 minutes fragments Limestone 164.0-166.0' - medium gray to 170.6' - Fracture, vertical, rough, undulating, medium dark gray, (N5 to N4), fine grained, strong HCl reaction, weak (R2), bedded limestone, trace voids up to 1/16"x1/16" 170.93' - Bedding plane or mechanical break, Limestone 166.0-171.0' - light olive gray, (5Y 171.27, 171.9' - Bedding plane or mechanical 5/2), strong HCl reaction, strong (R4), voids up to 1/16"x1/16" spherical cover 15-20% of surface, trace medium gray (N5) inclusions up to 1/2"x1/8" at 166.3', wavy horizontal R29: 10 minutes laminations from 166.0-166.6' 171.0-175.9' - Same as 166.0-171.0' except without wavy bedding 100% circulation loss, mix No Recovery 175.9-176.0' 1/4 bag bentonite to mud tub SC-6 collected at 177.0-

178 2



FRACTURES PER FOOT

5

NR

5

4

3

5

4

NR

>10

>10

>10

NR

>10

>10

NR

>10

>10

open 1/8'

RQD(%)

WATER LEVELS: 2.0 ft bgs on 3/13/07

CORE RUN, LENGTH, AND RECOVERY (%)

5 ft

84%

R31-NQ

5 ft 20

98%

R32-NQ

5 ft

86%

R33-NQ

5 ft

36%

R34-NQ

0

13 >10

DEPTH BELOW SURFACE AND ELEVATION (ft)

180

-138.1

185 -143.1

190

-148<u>.1</u>

195 -153<del>.</del>1 181.0

186.0

191.0

196.0

PROJECT NUMBER:	BORING NUMBER:				
338884 FI	A-09	SHEET	10	OF	

#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, NW/HW casing START: 3/13/2007

DESCRIPTION

173.60, 173.65, 173.8' - Bedding plane (3),

<10 deg, rough, undulating, organic infill,

174.12' - Bedding plane, <10 deg, rough, planar, open 1/16-1/8"

174.22, 174.5, 174.9, 174.97, 175.2' -

Bedding plane (5), horizontal, rough,

undulating, open 1/2" 175.75, 175.8' - Bedding plane (2)

horizontal, rough, planar, open 1/8"

staining, open 1/4"

unit underneath

undulating, tight

177.0' - Fracture or mechanical break, horizontal, rough, undulating, brownish black

178.2' - Bedding plane or mechanical break,

178.7' - Bedding plane or mechanical break,

<10 deg, rough, planar, organic infill 1/16" 179.0, 179.2' - Bedding plane (2), 8-10 deg,

179.75' - Bedding plane or mechanical break, 5-10 deg, rough, undulating, open 1/4",

bedding contact brown, more organic layered

181.25' - Bedding plane, 5-10 deg, rough,

181.85' - Fracture or mechanical break,

181.95' - Fracture or mechanical break.

182.4' - Fracture or mechanical break,

182.75' - Fracture, horizontal, rough,

183.25' - Fracture or mechanical break,

10-15 deg, rough, planar, open 1/16"

undulating, tight to open 1/4'

deg, rough, planar, tight

horizontal, rough, undulating, open 1/2-3/4"

182.9' - Fracture or mechanical break, 10-20

183.8, 183.9' - Fracture or mechanical break

(2), 5-10 deg, rough, undulating, 183.8' open 1/8", 183.9' open 1/16", black staining

undulating, tight
184.4' - Bedding plane, 5-10 deg, smooth,
undulating, open 1/8"
184.55' - Bedding plane or mechanical break,

5-10 deg, rough, undulating, tight 184.8, 184.81 - Bedding plane or mechanical

break (2), 0-5 deg, smooth, undulating, tight

184.9' - Bedding plane or mechanical break,

185.2' - Bedding plane or mechanical break,

20-30 deg, rough, undulating, open 1/4-1/8"

185.3' - Bedding plane or mechanical break,

5-10 deg, rough, planar, tight

60-70 deg, rough, undulating, tight

184.1' - Bedding plane, horizontal, rough,

undulating, organic infill 1/16" 181.65, 181.75' - Bedding plane (2),

horizontal, rough, undulating, tight

80-90 deg, rough, undulating, tight

40-50 deg, rough, undulating, tight 182.2' - Fracture, 75-85 deg, rough,

rough, planar, organic infill 1/16" 179.45, 179.55' - Bedding plane (2), 8-10 deg, rough, planar, open 1/16-1/8"

horizontal, rough, planar, top of fractured

DISCONTINUITIES

ORIENTATION: Vertical END: 3/22/2007 LOGGER: T. Stewart LITHOLOGY COMMENTS 90 ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE, WEATHERING, HARDNESS, DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS Limestone 176.0-180.2' - light olive gray, (5Y 5/2), moderate to strong HCI reaction, weak to medium strong (R2 to R3), trace cavities up to 3/8" R30: 9 minutes elongated, tiny voids up to 1/16" over 10-15% of surface, trace organics as wavy laminations <1/16" thick from 179.0-180.2 No Recovery 180.2-181.0 Limestone 181.0-185.9' - yellowish gray, (5Y 7/2), moderate to strong HCI reaction, weak to medium strong (R2 to R3), medium to lightly fossiliferous (molds, casts), tiny voids up to 1/8"x1/8" over 25-35% of surface. trace cavities with medium gray (N5) secondary mineral infill, fossils up to 1/4", wavy laminated bedding 1/16" thick at 187.3', yellowish gray matrix mottling at 183.0' R31: 10 minutes No Recovery 185.9-186.0' Limestone 186.0-190.3' - dusky yellow to light olive brown, (5Y 6/4 to 5Y 5/6), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids up to 1/16"x1/8" over 30-50% of surface, poorly fossiliferous (molds), 10-15% organics as short (3/8") discontinuous to laminated at 189.8', silt above yellowish gray (5Y 7/2), fossiliferous (molds, casts) R32: 8 minutes No Recovery 190.3-191.0 Limestone 191.0-192.3' - yellowish gray, (5Y Appearance is "chalk like" 7/2), very fine grained, strong HCI reaction, weak (R2), voids are micro forams and micro form molds up to 1/8"-1/4" over 20-25% of surface 192.3-192.8' - light olive gray, (5Y 5/6), fine grained, mild to moderate HCl reaction, very weak (R1), sharp change from 192.3-192.4 No Recovery 192.8-196.0' R33: 4 minutes Limestone 196.0-198.85' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, medium strong (R3), trace voids, up to 10% very fine to fine black particles in matrix



PROJECT NUMBER:	BORING NUMBER:				
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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724113.8 N, 457731.4 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING	METHOD A	ND E	QUIPN	IENT : CME 550 S/N 186073, mud rotary, NQ t	ools, NW/l	<del>I</del> W c	asing	ORIENTATION : Vertical
WATER	LEVELS : 2.0	) ft ba	s on 3	/13/07 START : 3/13/2007	END : 3/2	2/20	D7 LOGGER : T. Stewart	
				DISCONTINUITIES	J . J/L		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		l			F00	211102001	COMMENTO
N A E	Z'A∑		ZES T	DESCRIPTION		CL	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
	S.F.A	Q D (%)	158	DEPTH, TYPE, ORIENTATION, ROUGHN	FSS	SYMBOLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
ER.	86.8 80.8	Ωα	AC.	PLANARITY, INFILLING MATERIAL AN	1D	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	응필분	R	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIG	HTNESS	SΥ	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	5 ft	15	>10	185.5' - Bedding plane or mechanical b	reak.			
-	80%			rough, undulating, open 1/2-3/4"	-		- Limestone	-
I -			1 1	185.6' - Bedding plane or mechanical b	reak, _	Н	_ 198.85-200.0' - dusky yellow, (5Y	SC-7 collected at 198.85-
200			' '	rough, undulating, tight to open 1/16"	1-		6/4), mild to moderate HCl reaction,	199.8'
-158.1				186.0' - Bedding plane or mechanical be <10 deg, black staining or organic bedd	reak, — ling		— weak (R2), 60-70% tiny voids up to 1/8" (spherical), poorly fossiliferous	R34: 8 minutes
-			NR	planes	ıg _	Н	(molds), 20% fine to medium grained	Final core run end at 12:19
_	201.0			¬ 190.0' - Fracture zone	_	$\Box$	black particles, brownish black	Ending borehole -
_				196.35, 196.45, 196.7' - Bedding plane	or _		∖ staining near bottom	construction 20' of 6"
				mechanical break (3), rough, planar, tig			No Recovery 200.0-201.0'	diameter casing, 80' of 3"
_				198.85' - Bedding plane, 5-10 deg, smo planar, organics on surface	otn,   -		Bottom of Boring at 201.0 ft bgs on	diameter NW casing - 203.0' NQ coring assembly
-				199.8' - Fracture or mechanical break,	-		3/22/2007	Measured total depth at
-				horizontal, rough, undulating, open 1/2"	_		_	200.0' below ground
								surface
I -								3/22/07 15:03 depth
-					-		-	measured at 177.0' then
-					-		-	148.0' after abandonment 3/23/07 08:13 Water level
I -								at 0.75' below ground —
								surface
_					_		=	Abandonment completion
-					-		=	on 3/23/07 at 15:50
_					_		-	47 bags of Portland cement type I/II, 92 bags of
_								Type Gel, 2 bags of Sure
								Plug bentonite, one 50lb
-					-		<u> </u>	bag of 3/8" bentonite chips,
-					-		-	one 50lb bag of Quick Gel
I -					_		<u>-</u>	used for borehole abandonment
								abandonment
-							_	·
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-10	SHEET	1	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724149.3 N, 457766.2 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 2-7/8 tri-cone bit

WATER	LEVELS	: 1.0 ft bo	as on 03/-	10/07 S	START : 2/25/2007 END : 3/11/2007	LOGGER	: C.	LeBlanc, T. Stewart, C. Wallestad
				STANDARD	SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			SYMBOLIC LOG	
ACE,		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOF MOISTURE CONTENT, RELATIVE DENSITY O	R, DR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
HEVA EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALC	DGY	YMB	INSTRUMENTATION
<u> </u>				(N)			S	
						-		-
-						-		C. Sump and T. Stewart also logged part of
-						-		boring A-10
-						-		-
-						_		-
-						-		-
-						_	l	_
						_		
5	5.0							
37.2				3-36-50/2	Poorly Graded Sand With Silt (SP-SM)	ise. (-		Driller's Remark: Hard 5-13.5'
l -		0.8	SS-1	(86/8")	\ very fine to fine grained, no HCl reaction, 10%	.σο, / <sub>Γ=</sub>	╟	_
l -	6.5				\\nonplastic fines \\ Limestone Fragments	/ -		_
_					5.5-5.8' - very light gray. (N8), moist, very fine	_   _		-
-					grained, mild HCI reaction, some orange staining	9		-
-						-		-
-						-		-
-						-		-
10 -	100					-		-
10 <u> </u>	10.0				Silt (ML)		Ш	_
-		1.4	SS-2	8-18-50/5 (68/11")	10.0-11.4' - grayish yellow, (5Y 8/4), wet, very de very fine grained, nonplastic, very rapid dilatanc	ense, – v		-
-	11.4			(00/11)	moderate to strong HCl reaction, 10-15% sand	,, _	Ш	
-					material, slightly indurated 1" layers throughout	/-	l	1
						_		
_						_		
-						_		Driller's Remark: Softened at 13.5-15'
-						-		=
15 <u> </u>	15.0				Silt With Sand And Limestone Fragments (ML	,	Ш	_
		1.5	SS-3	18-29-35	15.0-16.5' - grayish yellow, (5Y 8/4), wet, fine to	_		-
-	10.5	1.5	33-3	(64)	coarse grained, nonplastic, very rapid dilatancy, moderate HCl reaction, 20-25% fine to coarse	-		-
-	16.5				sand-sized, 10% fine gravel-sized carbonate ma	aterial	Ш	-
-						-		-
-						-		-
1 -						_		1
1 -	1					_		1
20								

ORIENTATION: Vertical



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-10	SHEET	2	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724149.3 N, 457766.2 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 2-7/8 tri-cone bit ORIENTATION : Vertical

WATER	VATER LEVELS: 1.0 ft bgs on 03/10/07 START: 2/25/2007 END: 3/11/2007 LOGGER: C. LeBlanc, T. Stewart, C. Wallestad									
				STANDARD	SOIL DESCRIPTION COMMENTS					
BELOW SE AND ION (ft)	SAMPLE	RECOVE		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,					
DEPTH BELOW SURFACE AND ELEVATION (ft)		TILOUVE	#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION					
22.2	20.0	0.2	SS-4	18-29-50/5 (79/11")	Silt With Sand (ML) 20.0-20.2' - Same as 15.0-16.5' except except one 1/2" gravel-sized carbonate fragment.					
- - - -	21.5									
25 17.2 - - - -	25.0 25.3	0.1	SS-5	50/3 (50/3")	Silty Sand (SM) 25.0-25.1' - dusky yellow, (5Y 6/4), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, sand-sized carbonate material, 30% fines					
30 12.2 - - -	30.0	0.3	SS-6	50/4 (50/4")	Silty Sand (SM)  30.0-30.3' - dark yellowish orange, (10YR 6/6), moist, very dense, fine to coarse grained, moderate HCl reaction, 25% silt-sized grains, carbonate material					
35	35.2	0.2	SS-7	50/2 (50/2")	Limestone Fragments  35.0-35.2' - moderate yellowish brown, (10YR 5/4), fine to coarse grained, mild to moderate HCl reaction, gravel fine to coarse to 1", fossiliferous					
40					-					
1										



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-10	SHEET	3	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724149.3 N, 457766.2 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 2-7/8 tri-cone bit ORIENTATION : Vertical

WATER LEVELS: 1.0 ft bgs on 03/10/07 START: 2/25/2007 END: 3/11/2007 LOGGER: C. LeBlanc, T. Stewart, C. Wallestad								
				STANDARD	SOIL DESCRIPTION		g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	AL (ft) PENETRATION TEST RESULTS					DEDTILOF CACINO DOUGLES DATE
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	}	30LIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
LEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOG	ìΥ	SYMBOLIC LOG	INSTRUMENTATION
2.2	40.0			(14)	Sandy Silt (SM)			
-		1.3	SS-8	31-47-45	40.0-41.3' - moderate yellowish brown, (10YR 5/4) moist to wet, hard, mild to moderate HCl reaction,	), –		-
-	41.5			(92)	49% sand and gravel, 10-15% fines, carbonate	_		-
-	11.0				materials	/ -		-
-						_		_
_								_
_						_		_
_						_		_
45 -2.8	45.0			40.50/0	Silty Sand (SM)		THE SE	
-2.0	45.8	0.8	SS-9	40-50/3 (90/9")	45.0-45.75' - Same as 40.0-41.3' except trace	_		-
-				,	gravel-sized rock fragments	/_		-
-						-		-
-						-		-
-						-	l	-
-						-		_
-						-		-
-						_	1	-
50	50.0					_	1	
-7.8	50.4	0.1	SS-10	50/4.5 (50/4.5")	Limestone Fragments With Silty Sand 50.0-50.1' - pale yellowish brown, (10YR 6/2), mild	1 to [		
				(50/4.5)	moderate HCI reaction, silty sand (SM) cuttings, si	ilty / _		_
_					sand is same as 45.0-45.75', fossiliferous			_
_						_		_
_						_		_
-						_		-
-						-		_
-						-		-
	55.0					-		-
55 <u> </u>	55.0 55.3	0.1	SS-11	50/3			-	_
-				(50/3")	\_\_\_\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	/ -		-
-						-		-
-						_		-
-						-		_
						_		
						_		
_								_
-						_		_
60								



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-10	SHEET	4	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724149.3 N, 457766.2 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 2-7/8 tri-cone bit

ORIENTATION : Vertical

WATER	LEVELS	: 1.0 ft b	gs on 03/1	10/07	START: 2/25/2007 END: 3/11/2007 LOGGER: C. LeBlanc, T. Stewart, C. Wallestad
				STANDARD	SOIL DESCRIPTION 5 COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	RECOVE		PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  BY DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
-17.8 - -	<b>60.0</b> 62.0	0.1_	\SS-12 <i>)</i>	50/1 (50/1")	Limestone Fragments 60.0-60.1' - light olive gray, (5Y 5/2), mild to moderate HCl reaction  61.5-62.0' Heavy chatter, drill time increases, cuttings show weak limestone fragments, light olive gray, (5Y 5/2), finish soil drilling at
65_ -22.8 -	62.1	0.0	(SS-13)	50/1 (50/1")	Limestone Fragments 62.0-62.1' - light olive gray, (5Y 5/2), moderate HCl reaction, weak (R2) Begin Rock Coring at 62.0 ft bgs See the next sheet for the rock core log
70					
75 -32.8 - - - - - - - - - - - - -					



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	Δ-10	SHEET	5 OF 12

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724149.3 N, 457766.2 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

				1211 . CIVIL 330 3/14 100073, Hidd Totally, 14Q 10013, 1414		<u> </u>	ONENTATION: Vertical			
WATER	LEVELS : 1.0	ft bg	s on 0		11/20					
>00	. (6			DISCONTINUITIES	ي [	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S.	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,				
岩병흔	AUN H, A	(%) Q	FRACTURES PER FOOT		12	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND			
F A A	SE F	) <u> </u>	25	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	/BC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD			
	COF	a Q	FF H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.			
	62.0		_	62.0-62.5' - Fracture zone or mechanical	111	Silt (ML)				
-			NA	break, rough, rock fragments, irregular	ш	62.0-62.5' - moderate yellowish	C Cump begins legging at			
_			>10	fractures		brown, (10YR 5/4), moderate to	C. Sump begins logging at 62.0'			
			>10	62.9' - Fracture, rough, undulating	ш	strong HCl reaction, silt with very fine sand, (20-25%) carbonate material	3=.3			
			- 10	63.4' - Fracture, rough, undulating 63.4-64.0' - Fracture zone, rough, irregular	Н	Limestone	1			
-	R1-NQ			fractures	П	62.5-63.5' - light olive gray, (5Y 5/2),	1			
	5 ft	36	1	64.0' - Fracture, horizontal, smooth, planar	Н	moderate HCl reaction, weak to	1			
65 <u> </u>	68%		<u> </u>	65 0' Fracture herizontal rough undulating	ш	medium strong (R2 to R3), voids to	Driller's remark: Soft 65.0-			
-22.0			1	65.0' - Fracture, horizontal, rough, undulating 65.1' - Fracture, 70 deg, rough, undulating	Н	1/16" over 10-15% of surface - 63.5-64.0' - Same as 62.5-63.5'	66.0'			
_				65.4' - Fracture, horizontal, rough, undulating	Щ	except except weaker and friable	]			
			NR		Н	64.0-65.4' - Same as 62.5-63.5'	R1: 3 minutes			
-	67.0				-	ш	<ul> <li>except weak (R2), except voids</li> <li>1/4"-3/8" over 1-2% of surface (fossil</li> </ul>	1		
I -	67.0			67.0, 67.1, 67.9, 68.6, 68.8, 68.9' - Fractures	H	molds), some infilling	1			
-			3	(6), horizontal, rough, undulating to planar		<ul> <li>No Recovery 65.4-67.0'</li> </ul>	1			
-				-	ш	Limestone	-			
l _			3	_	ш	67.0-68.6' - dusky yellow, (5Y 6/4), - 15-25% voids (1/16"-1/8") over				
			ľ		Н	surface, few larger voids (fossil				
	R2-NQ			69.0-69.1' - Fracture zone, rock fragments	Ш	molds), trace dark gray crystals trace	1			
70	5 ft 94%	62	2	69.1' - Bedding plane, horizontal, smooth to rough, stepped	ш	<ul> <li>clear recrystallized calcite, subhedral to euhedral in voids</li> </ul>	SC-1 collected at 69.35-			
70 <u> </u>	34 /0			69.3' - Bedding plane, horizontal, smooth to	Н	68.6-69.3' - grayish yellow, (5Y 8/4),	70.22'			
-				rough, undulating to stepped	$\vdash$	<ul> <li>moderate to strong HCl reaction,</li> </ul>	1 -			
_			2	70.2, 70.6' - Mechanical break (2), 10 deg,	Н	extremely weak to very weak (R0 to R1), finely laminated	1			
l _					1		rough, undulating to planar	Ш	= 69.3-71.7' - yellowish gray to light	R2: 5 minutes
	72.0		NR	71.4, 71.7' - Fractures (2), horizontal, rough, stepped	Н	olive gray, (5Y 7/2 to 5Y 5/2),				
-					П	moderate HCl reaction, weak to	1			
-			3	72.3' - Fracture, 10 deg, rough, undulating, - irregular fractures	Н	medium strong (R2 to R3), 10-15% voids (up to 1/16") over surface, few	1			
-				72.4-73.6' - Fracture zone, 70-85 deg, rough,	ш	<ul> <li>variably spaced larger voids/cavities</li> </ul>	1			
-			3	undulating, intersecting high angle fracture	Н	_ (fossil molds up to 3/8"), fine (1/16")	-			
_				set, few surface pyrite coatings		clear subhedral to euhedral carbonate crystals in few void spaces	1			
_	R3-NQ 5 ft	52	3	73.9' - Fracture or mechanical break, horizontal, rough, undulating	H	□ No Recovery 71.7-72.0'	_			
75	94%	52		74.4' - Fracture, horizontal, rough, stepped,	Ш	Limestone				
-32.8			NA	undulating parting, black finely laminated	1	72.0-74.4' - dusky yellow, (5Y 6/4), very fine to fine grained, strong HCl				
-			'*^	organic layer 74.41' - Fracture, rough, clay infilling,	1	reaction, weak to medium strong (R2	1			
-				fractures with light olive gray (5Y 5/2) silty	<b>1</b>	to R3), voids (1/32"-1/16") variable	R3: 8 minutes			
-			2	clay infilling on surface	口	density across surface ranging from 15-25% in zones, few larger	1			
-	77.0		NR	74.9' - Fracture, rough, dark brown/black coating on surface, organics- pyrite		void/cavities, (fossil molds), very fine,				
I -			NA	76.3-76.7' - Fractures (2), smooth	•:•:	black, wavy laminations				
			2	77.0-77.5' - Fracture zone	Ш	Silt (ML)				
			_	77.5, 77.55' - Fractures (2), horizontal, rough, irregular fractures	Ш	74.4-76.3' - very light gray, (N8), strong HCl reaction, very weak (R1),	1			
_			3	78.3-78.6' - Fractures (2), 60 deg, rough,	$\vdash$	5% limestone clasts up to 3/8", sub	1			
-	R4-NQ		-	undulating, tight, partially healed fractures,	Ш	rounded to rounded, light olive gray	-			
-	5 ft	15	>10	fine black speckled staining	Ш	(5Y5/2), laminated zone with light	-			
80	94%			78.8-79.3' - Fracture zone, 60-90 deg, rough, undulating, multiple high angle fractures,	ш	gray consolidated silt fragments up to	_			
-37.8			3	open to tight, dark gray-black speckled	П	Limestone	]			
I -				staining	Ш	76.3-76.7' - Same as 72.0-74.4'	1			
			2	79.3-79.4' - Fracture zone, rock fragments 80.4, 80.6, 80.8, 81.1' - Fractures (4), rough,	$\Pi$	No Recovery 76.7-77.0'	R4: 9 minutes			
-	000			planar, irregular	П	F)	] 1			
-	82.0		NR	<u> </u>	$\vdash \vdash$	<u> </u>	<del>                                     </del>			
1			ı				i l			

ORIENTATION: Vertical



FRACTURES PER FOOT

2

1

NR

2

1

4 60

1

NR

4

2

NA

>10

NR

2

2

NR

48

RQD(%)

58 3

WATER LEVELS: 1.0 ft bgs on 03/10/07

CORE RUN, LENGTH, AND RECOVERY (%)

R5-NQ

5 ft

60%

R6-NC

5 ft 82%

R7-NQ

5 ft

80%

R8-NC

5 ft

60%

102.0

22 3

87.0

920

97.0

DEPTH BELOW SURFACE AND ELEVATION (ft)

85 -42.8

90

-47.<del>8</del>

95

-52.8

100

-57.8

PROJECT NUMBER:	BORING NUMBER:					
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#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724149.3 N, 457766.2 E (NAD83)

START: 2/25/2007

**DESCRIPTION** 

DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND

THICKNESS, SURFACE STAINING, AND TIGHTNESS

81.1-81.3' - Clay seam, poorly to moderately

81.3' - Fracture, horizontal, rough, undulating

83.7' - Fracture, horizontal, rough, undulating

84.0' - Fracture, 45 deg, rough, undulating to

84.6' - Fracture, horizontal, rough, undulating

84.7' - Fracture, 45 deg, rough, planar, some

87.0' - Mechanical break, horizontal, rough,

87.7-88.2' - Fracture zone, discontinuity with

88.8' - Fracture, 10 deg, rough, undulating,

89.3, 89.5' - Fractures (2), rough, black to

associated with larger voids/solution cavities

89.6' - Fracture, horizontal, contact with silty

89.8' - Fracture, 30-45 deg, rough, multiple

91.0' - Fracture, rough, break associated with

92.0' - Mechanical break, horizontal, planar

fracture edge, (pyrite-organics) 92.8, 93.2, 93.8' - Fractures (3), horizontal,

rough, stepped, loose, silty sand material on

undulating, parting along fine lamination, dark

95.1' - Fracture, 60 deg, planar, loose sand

97.1' - Fracture or mechanical break, 60 deg, rough, undulating 97.6' - Fracture or mechanical break,

98.3' - Fracture, 45 deg, rough, undulating,

98.6' - Mechanical break, rough, undulating,

99.8' - Fracture, 50-60 deg, rough, planar

material, fine grained pyrite on surface

95.1-96.0' - Fracture zone, limestone

92.2' - Fracture, 45 deg, rough, planar 92.21' - Fracture, horizontal, black coating on

dark brown staining, irregular fractures

90.3' - Mechanical break, horizontal

94.5' - Fracture, horizontal, smooth,

brown color, friable zone

horizontal, rough, planar

99.2' - Fracture, 60 deg, planar 99.4' - Fracture, 15 deg, rough, undulating

planar, tight, dark black/gray fine grained

82.6' - Fracture, rough, stepped, fine sand

DISCONTINUITIES

indurated laminated silt (ML)

sized particles on surface

fine grained pyrite coating

weak limestone interbedded

coating

undulating

iron staining

material

large cavity

faces

fragments

irregular

near vertical

tight healed fractures

82.2' - Fracture, rough, stepped

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

END: 3/11/2007

9

silt

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION: Vertical LOGGER: C. LeBlanc, T. Stewart, C. Wallestad LITHOLOGY COMMENTS ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE WEATHERING, HARDNESS, AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS Sand (SW) 77.0-77.5' - strong HCI reaction, well graded fine sand sized carbonate derived grains, loose, friable, 10-15% fine clear crystals, (secondary calcite), possible fine silica grains (<5%) Limestone 77.5-81.1' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCI SC-2 collected at 85.06reaction, medium strong (R3), few larger voids irregular shaped up to 3/4" in size with dark olive gray R5: 4 minutes staining, Silt (ML) 81.1-81.4' - consolidated carbonate Limestone 81.4-81.7' - Same as 77.5-81.1' No Recovery 81.7-82.0' Limestone 82.0-85.0' - grayish orange, (10YR 7/4), moderate to strong HCI reaction, weak (R2), color changes with depth to yellowish gray (5Y 7/2), 15-25% voids (1/8") over surface, 1-2% larger voids/cavities (fossil molds) up to 3/8" length, iron R6: run time not recorded staining, few fossil molds infilled with very pale orange (10YR 8/2) soft material No Recovery 85.0-87.0' Limestone 87.0-87.7' - yellowish gray, (5Y 7/2), moderate to strong HCI reaction, medium strong (R3), fossiliferous molds and casts 1/16"-3/16" over 5-20% of surface, larger cavities up to 3/4" (fossil molds) 87.7-88.2' - white to yellowish gray, (N9 to 5Y 8/1), strong HCl reaction, very weak (R1), fossiliferous (molds & casts) R7: run time not recorded 88.2-89.6' - pale yellowish brown, (10YR 6/2), moderate to strong HCI reaction, 15-20% voids (1/16"-1/8"), 2% larger voids/cavities, laminated black organic infilling at 89.4' 89.6-91.1' - pale yellow gray, (5Y 8/1), strong HCl reaction, weak to medium strong (R2 to R3), silt sized material (inclusions) and thin layers No Recovery 91.1-92.0'

R8: run time not recorded



PROJECT NUMBER:

33884.FL

BORING NUMBER:

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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724149.3 N, 457766.2 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, NW casing

TER I	LEVELS: 1.0	) ft bas	s on 0:	3/10/07 START : 2/25/2007 END : 3	/11/200	7 LOGGER : C. LeBlanc, T. Stewa	t. C. Wallestad
		, it by	3 011 00	DISCONTINUITIES		LITHOLOGY	COMMENTS
SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING FLUID LOSS, CORING RATE A SMOOTHNESS, CAVING RO DROPS, TEST RESULTS, ET
-			>10	102.1, 102.7' - Fractures or mechanical break (2), horizontal, rough, undulating 102.3' - Fracture, 60-70 deg, smooth, thin	H	Limestone 92.0-93.2' - yellowish gray, (5Y 8/1), strong HCl reaction, weak (R2),	
			>10	coating of loose silt sized material on fracture surface 102.7-103.3' - Fracture zone, limestone		black organic/pyrite mottling and castings on fracture/void surfaces, voids (1/16") over 10-15% of surface,	
- 05_ 2.8	R9-NQ 5 ft 65%	38	0	fragments -		fossiliferous (molds/casts)  Silt (ML)  93.2-95.2' - moderate HCl reaction,	
- - -	107.0		NR			medium strong (R3), carbonate silt material with gravel-sized limestone fragments with 10-15%, voids (1/16-1/8"), large solution cavity (3/4"x3/4")	R9: 4 minutes
1	107.0		1	107.1' - Fracture, 45-60 deg	目	Limestone 95.2-96.0' - yellow gray, (5Y 8/1), strong HCl reaction, weak (R2), pyrite on surfaces	
			1	108.5' - Fracture, 60 deg, rough, undulating, <1% fine black trace secondary pyrite		No Recovery 96.0-97.0' Limestone 97.0-100.0' - yellowish gray, (5Y 8/1),	SC-3 collected at 107.3- 108.35'
0 .8	R10-NQ 5 ft 100%	54	2	crystals on surface 109.4' - Fracture or mechanical break, horizontal –		strong HCl reaction, weak (R2), 10-15% voids (1/16-1/8") over surface, fossil molds/casts, cavities	
.o _ _			2	109.5' - Fracture, 45 deg, rough, stepped, trace very fine black pyrite crystals 110.8' - Fracture or mechanical break,		and molds up to 3/8" over 1-2% of surface.  No Recovery 100.0-102.0' Limestone	R10: 4 minutes
-	112.0		6	horizontal, rough 110.9, 111.0, 111.2, 111.5, 111.6, 111.8, 112.0' - Fractures (7), horizontal, rough, planar to undulating, open, fine "chalky"	Ħ	102.0-105.25' - yellowish gray, (5Y 8/1), strong HCI reaction, weak (R2), percent voids vary from 5-15%, large	TVIO. 4 minutes
-			1	material on surface 112.0' - Fracture or mechanical break, horizontal, smooth, planar		fossil molds/cavities up to 3/8" (mollusks) No Recovery 105.25-107.0'	
-	R11-NQ		3	113.7' - Fracture, horizontal, iron oxide staining	H	Limestone 107.0-114.6' - yellowish gray, (5Y 8/1), fine grained, strong HCl	
5 .8	5 ft 96%	86	1	113.71-113.8' - Mechanical break or fracture zone, horizontal, (drill pin)		reaction, weak (R2), small voids (1/16"-1/8") over <5% of surface, very few larger (>3/16") cavities/fossil molds on surface chalky appearance	
			2	Fractures or mechanical break (6), horizontal, undulating	掛	and texture  114.6-116.8' - yellowish gray, (5Y  8/1), strong HCl reaction, weak (R2),	R11: 5 minutes
	117.0		NR 5	117.0-117.3' - Fracture zone, loose carbonate fine sand		highly fossiliferous( molds and casts) up to 30-40%, somewhat friable \no \text{No Recovery 116.8-117.0'}	
-			3	117.3, 117.5, 117.9' - Fractures (3), horizontal, rough, undulating, fine carbonate sand on surface	目	Sand (SP) 117.0-117.3' - strong HCl reaction, well sorted carbonate sand, 5% fine	
_	R12-NQ 5 ft 100%	70	3	118.5' - Fracture, 45 deg, rough, undulating to planar 118.8, 118.7, 119.1, 120.1' - Bedding plane (4), horizontal, smooth to rough, planar	目	clear subhedral calcite crystals, possible trace silica grains, possibly slough	
.8 -	100%		3	(4), nonzonial, smooth to rough, planar 120.1, 120.6, 121.1' - Fractures or mechanical break (3), 0-10 deg, rough, undulating		_	
1	122.0		>10	121.1-122.0' - Fracture zone, irregular fracture surfaces, limestone fragments	H		R12: run time not recorded



PROJECT NUMBER: BORING NUMBER: 338884.FL

A-10

SHEET 8 OF 12

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724149.3 N, 457766.2 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

CORING	INETHOD A	ND E	JUIPIV	IENT: CME 550 S/N 186073, mud rotary, NQ tools, NW	casing		ORIENTATION : Vertical
WATER	LEVELS: 1.0	ft bg	s on 0	3/10/07 START : 2/25/2007 END : 3/	11/20	D7 LOGGER : C. LeBlanc, T. Stewar	t, C. Wallestad
>	(5)			DISCONTINUITIES	ტ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		SI.	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OUTE AND DEDTH OF GARNING
ᆱᇬ	RUN H, A	(%) Q	FRACTURES PER FOOT	DEDTIL TYPE OPIENTATION POLICUNESS	<b>1</b> 일 [	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
FF A ¥	RE VGT	) Q (	ACT R F(	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	MBC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SSE	Sää	R Q	F.E.	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SY	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				122.1, 122.5, 123.25, 123.5, 123.8, 124.1,	ш	Limestone	NQ rod stuck at 117.0'
_			3	124.3, 124.35, 124.55, 124.75, 124.95, 125.1,	╁┼	- 117.3-117.9' - pale yellowish gray, (5Y 8/1), coarse grained, very weak	after completing R-12, hole - abandoned and
-				125.25, 125.4, 125.5, 125.6, 125.7, 125.8, 122.8' - Mechanical break (19), horizontal,	$\Box$	to weak (R1 to R2), fossiliferous	replacement hole drilled to
-			3	smooth, planar	╀╫	<ul> <li>mold and casts up to 3/16", friable</li> </ul>	obtain information below -
-	D40 NO			122.95' - Fracture, 40 deg, smooth,	$\perp$	into coarse sand particles, 10-15% argillaceous sand, iron staining on all	122' T. Stewart begins logging
_	R13-NQ 5 ft	15	6	undulating, open, black particles (1/5"-1/3") in matrix on surface		- sand sized inclusions	at 122'
125	78%		Ĺ	matrix off surface	$oldsymbol{oldsymbol{eta}}$	117.9-122.0' - very pale yellowish	NW casing at 120' below
-82.8			7			gray, (5Y 8/1), strong HCl reaction,	ground surface, water level
			′		Ш	<ul> <li>very weak to weak (R1 to R2), increasing percentage of large fossil</li> </ul>	1.0' below ground surface – R13: 19 minutes
-						molds/casts up to 3/8", few cavities	1
-	407.0		NR		╂┼┦	<ul> <li>infilled with very fine grained silty material</li> </ul>	-
-	127.0					122.0-124.65' - yellowish gray, (5Y	-
-			>10		╀┼	<ul> <li>7/2), fine to medium grained, strong</li> </ul>	-
_				127.8' - Fracture, vertical, smooth,	ш	HCl reaction, very weak (R1), voids  <1/16" over 10-15% of surface, with	_
I _			5	undulating, tight, black staining	Н	four 3/16"x3/16" trace ellipsoid	
			"	128.1, 128.2,128.4, 128.75' - Mechanical break (4), horizontal, smooth, planar		shaped cavities , 30% fine to medium	
	R14-NQ			break (4), Horizontal, Sillootti, planai	$\mathbb{H}$	grained black particles, 15% fine grained white particles (fossil	
130	5 ft 64%	0	>10		ш	fragments), color change to yellowish	1
-87.8			0	_	$\dagger \Box$	gray (5Y 8/1) at 128.65	
_					Ħ	_ 124.65-125.9' - Same as 122.0-124.65' except medium	-
-			NR		世	grained, moderately fossiliferous,	R14: 24 minutes
_					₩	medium gray (N5) lense at 125.5'  No Recovery 125.9-127.0	Driller's Remark: 50% -
_	132.0				ш	Limestone	circulation loss near top ofR14-NQ
_			7	132.35' - Fracture, 50 deg, smooth, stepped,	$\Box$	_ 127.0-128.95' - yellowish gray, (5Y	-
_				tight	$\blacksquare$	7/2), medium grained, strong HCl reaction, weak (R2), 15% fine	_
			>10	132.4, 132.55, 132.65, 132.75, 132.9, 133.1, 133.23, 133.35, 133.55, 133.65, 133.75,		grained black particles, moderately	
			-10	134.55' - Mechanical break (12), horizontal,	Ш	fossiliferous (fossil fragments, casts),	
	R15-NQ			smooth, planar	Ш	<ul> <li>voids over 45% of surface, trace short black laminations &lt;1/16" thick</li> </ul>	1
135	5 ft 88%	23	>10		Н	near 128.8'	1
-92.8	00 /0			134.85' - Fracture, 5 deg, rough, undulating,		— 128.95-130.2' - yellowish gray, (5Y	-
-			4	open 2/5" 135.05, 135.15' - Mechanical break (2)	╂┴┤	7/2), fine grained, strong HCl reaction, weak (R2), trace voids, few	-
-			0	135.53' - Fracture, horizontal, smooth,	Ш	fossil casts up to 3/16"x1/8", 1" weak	R15: 13 minutes
-				undulating, tight to open 1/10" 135.77' - Fracture, 5 deg, rough, undulating,	$\Box$	zone at 129.95' No Recovery 130.2-132.0	Driller's Remark: Return of -
-	137.0		NR	open 3/4", 2/5" thick infilling	$\Box$	- Limestone	circulation at approximately
1 _			>10	<b>.</b>	片	132.0-135.8' - yellowish gray, (5Y	135.0' below ground surface –
			[ 10		Щ	8/1), fine grained, strong HCl reaction, weak (R2), 10-15% voids	Canado
1 7				138.05' - Fracture, vertical, tight, healed	Ш	up to 1/16", trace to many ellipsoidal	1
-			>10	138.1-138.3' - Fracture zone 138.7' - Fracture, 70 deg, tight, healed, 1/16"	$\vdash$	cavities up to 1-1/10", infilled with	1
1 -	R16-NQ	!		thick infilling	$\Box$	medium gray color, cavity size increase with depth, up to 40% very	
4.0	5 ft	7	2	138.95, 139.15' - Fractures (2), 50 deg,	╂┴┤	fine to fine grained fossil fragments	-
140 <u> </u>	56%			rough, undulating, tight 139.55' - Fracture, vertical, tight, vertical,	łП	in matrix, medium grained from	
				black staining, 1/16" thick infilling	+	135.15-135.7', laminated from 132.0-132.35' (moderate olive brown	-
-			NR		$\Box$	<ul> <li>5Y 4/4) with medium grained</li> </ul>	<sub>  1</sub>
_						particles, organic laminations <1/16" at 134.0'	R16: 22 minutes
	142.0					at 134.0	
					1		



PROJECT NUMBER: BORING NUMBER: 338884.FL A-10 SHEET 9 OF 12

#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724149.3 N, 457766.2 E (NAD83)

ELEVATION: 42.2 ft (NAVD88)  $DRILLING \underline{\ CONTRACTOR: Universal\ Engineering\ Sciences,\ Gainesville,\ FL;\ Driller:\ M.\ Boatright;\ Cathead\ Operator:\ M.\ Griffinnes and Contractor and Contractor$ 

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION: Vertical WATER LEVELS: 1.0 ft bgs on 03/10/07 START: 2/25/2007 END: 3/11/2007 LOGGER: C. LeBlanc, T. Stewart, C. Wallestad DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS DROPS, TEST RESULTS, ETC. CHARACTERISTICS 135.8-136.4' - light olive gray, (5Y 6/1), strong HCl reaction, weak to 142.0-143.8' - Fracture zone >10 medium strong (R2 to R3), trace voids up to 1/16", many irregularly shaped cavities up to 2-2/5" long x 1 2/5" wide, infilled with moderate olive 143.8' - Fracture, horizontal, rough, planar, brown (5Y 4/4) medium to coarse R17-NQ SC-4 collected at 144.1open grained material 37 1 5 ft 144.1, 145.0' - Fractures (2), horizontal, 145.05' No Recovery 136.4-137.0' 145 80% rough, planar, tight -102.8 Limestone 137.0-139.8' - light olive gray, (5Y 0 6/1), very fine grained, strong HCI reaction, medium strong (R3), 75% R17: 17 minutes voids up to 1/8"x3/16", cavities over NR 15-20% of surface (near top of run), Last core run on 3/10/07 147.0 infilled with coarse grained material, Resume drilling 07:55 on brownish black laminations <1/16" 0 3/11/07 containing sub rounded clasts up to 3/16" in size at 138.4-138.6', series SC-5 collected at 147.0-148.1, 148.2, 148.3, 148.32' - Bedding plane of 70-90 degree fractures (healed 5 148 1 (4), horizontal, rough, planar, tight to open tight) over 138.6 to 139.8' interval with black mottled appearance R18-NO 148.93' - Bedding plane, horizontal, rough, No Recovery 139.8-142.0' 2 58 5 ft 75% planar, silty infilling Limestone 150 149.4, 150.0, 152.05, 152.1' - Mechanical 142.0-143.8' - yellowish gray, (5Y -107.8 0 break (4) 7/2), medium to coarse grained, strong HCI reaction, very weak to weak (R1 to R2), matrix grain colors R18: 22 minutes NR are white (N9) (33%), yellowish gray (5Y 8/1) (33%), and gray (33%) Driller's Remark: 152 0 143.8-144.1' - Same as 142.0-143.8' Continued loss of except brown and white laminations 2 circulation with trace cavities infilled with white material 144.1-145.05' - Same as 153.3' - Bedding plane, horizontal, smooth, 5 143.8-144.1' except light olive gray undulating, open 1/8"-1/4" (5Y 5/2), 15-20% coarse grained 153.43' - Bedding plane, horizontal, smooth, R19-NQ gray particles >10 undulating, tight 39 5 ft 145.05-146.0' - Same as 86% 153.48, 153.55, 153.63' - Bedding plane (3), 155 143.8-144.1' except fine grained, no horizontal, smooth, planar, tight -112.8 gray particles 153.6' - Fracture, vertical, rough, undulating, 6 No Recovery 146.0-147.0' tight, black particles in matrix Limestone 153.8' - Bedding plane or mechanical break, R19: 14 minutes 147.0-148.37' - dark yellowish horizontal, smooth, planar, tight NR orange, (10YR 6/6), fine to medium 154.05' - Bedding plane or mechanical break, 157.0 grained, moderate HCI reaction, <10 deg, smooth, undulating, open 1/4" weak (R2), 3/16"x1/8" voids over 154.05-155.5' - Fracture zone 4 15% of surface, fossiliferous (trace 157.25, 157.4' - Bedding plane or mechanical molds), bedding plane at 147.9' at 40 break (2), <10 deg, smooth, undulating, open degrees 4 148.37-148.93' - yellowish gray, (5Y 8/1), medium grained, strong HCl 157.45' - Bedding plane or mechanical break, <10 deg, smooth, undulating, open 1/2" R20-NQ reaction, extremely weak (R0) 157.8' - Bedding plane or mechanical break, 42 1 148.93-150.74' - dark yellowish orange, (10YR 6/6), fine to coarse 5 ft horizontal, smooth, undulating, open 1/8' 160 92% 158.05' - Bedding plane or mechanical break, -117.8 grained, strong HCl reaction, weak smooth, undulating, open 1/8"-1/4" 158.47, 158.95' - Bedding plane or (R2), trace voids to 1/16" over <5% >10 surface, some infill of white material, mechanical break (2), horizontal, open R20: 19 minutes trace fine to medium grained black 1/8"-1/2" particles NR 162.0 No Recovery 150.74-152.0



BORING NUMBER: PROJECT NUMBER: 338884.FL A-10 SHEET 10 OF 12

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724149.3 N, 457766.2 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CODING					•	3 Sciences, Gainesville, i. E., Dillier. IVI. Boatingrit,	•
CORING	METHOD A	ND E	JUIPIV	ENT : CME 550 S/N 186073, mud rotary, NQ tools, NW	casın		ORIENTATION : Vertical
WATER	LEVELS : 1.0	) ft bg	s on 03		11/20		
≩Ω⊋	0%			DISCONTINUITIES	ဗ္ဂ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
				159.1' - Bedding plane or mechanical break,		Limestone	
-			9	horizontal, smooth, planar, open 1/4"-1/2"	╁	- 152.0-156.3' - very pale orange,	-
-				159.3, 159.4' - Mechanical break (2) 160.05-161.3' - Fracture zone or mechanical	Ė	(10YR 8/2), strong HCl reaction, weak (R2), voids to 1/8" covering	-
-			2	break, horizontal, smooth, planar	╀	- 25-30% of surface, moderately	-
-	DOL NO			162.27, 162.3, 162.4, 162.6, 162.7, 162.75, 162.82, 162.9, 162.98' - Bedding plane or	$\perp$	fossiliferous, (mold and casts) 5-10% white inclusions up to 1-1/4" (	-
-	R21-NC 5 ft	18	6	mechanical break (9), smooth, planar, tight to		- irregular shape), fine brownish black	-
165_	88%		Ů	open 1/8"	$\perp$	laminations (<1/16") at	
-122.8				163.9' - Bedding plane, horizontal, smooth, undulating, open 1/8"-1/4", dark staining		153.48-153.63', contains vertical fracture across interval, up to 20%	_
			>10	163.98' - Bedding plane or mechanical break,	$\vdash$	fine black particles	
_				<10 deg, rough, undulating, black staining	Ш	No Recovery 156.3-157.0'	R21: 19 minutes
-	167.0		NR	164.1, 169.25, 164.4, 164.5, 164.85, 164.95' - Bedding plane or mechanical break (6),	$\top$	<ul> <li>Limestone</li> <li>157.0-161.6' - yellowish gray to</li> </ul>	1
-	107.0			horizontal, smooth, planar to undulating, tight	1	dusky yellow, (5Y 7/2 to 5Y 6/4), fine	
-			2	to open 1/8"-1/4" 166.0' - Mechanical break		to medium grained, strong HCI     reaction, very weak to weak (R1 to	-
-	-			166.1' - Bedding plane or mechanical break,	₩	R2), trace voids up to 1/8" elliptical,	-
-			3	horizontal, smooth, planar, tight to open 1/8" 166.25-166.3' - Fracture (2), 80 deg, rough,	╨	poorly fossiliferous (few	SC-6 collected at 168.4-
-	R22-NC			undulating, tight, reddish brown staining	╁	molds,casts), 3/8"x3/16", bedding plane laminations <1/16" from	169.3'
-	5 ft	31	3	167.05' - Mechanical break or bedding plane,	+	_ 160.2-161.6'	-
170	84%			horizontal, smooth, planar, tight 167.75-167.9' - Fracture zone		No Recovery 161.6-162.0' Limestone	
-127.8			4	168.1' - Bedding plane or mechanical break,	₽	_ 162.0-166.4' - yellowish gray to	_
l _				horizontal, smooth, planar, open 1/8"-1/4" 168.2' - Bedding plane or mechanical break,	$\Box$	moderate olive brown, (5Y 7/2 to 5Y 5/4), fine grained, strong HCl	_
l _			0	<10 deg, rough, undulating, tight to open		reaction, weak to medium strong (R2	R22: 23 minutes
	172.0		NR	1/4"-3/4"	Н	to R3), voids up to 1/16" over 40% of	
				168.4' - Bedding plane, smooth, undulating, open 1/4"	Ė	surface, 163.0-163.09 ' interval has voids to 3/16" covering 90% of	
-			3	169.3' - Bedding plane, horizontal, smooth,		surface, moderately fossiliferous	_
-				undulating, open 1/8"-1/4" 169.55-169.7' - Fracture zone	ш	from 163.0-163.9' (some molds), 2"x1/4" inclusions up to 5%, from	_
-			6	169.8' - Bedding plane, horizontal, smooth,		163.0-163.1', irregular shaped	<u> </u>
-	R23-NC	l !		undulating, 1/8"-1/4" open 170.1' - Bedding plane or mechanical break,	╁	<ul> <li>inclusions, medium gray in color.</li> <li>No Recovery 166.4-167.0'</li> </ul>	-
475	5 ft	35	4	<10 deg, smooth, undulating, 1/8"-1/4" open		Limestone	-
175 <u> </u>	84%			170.3-170.5' - Fracture zone —	世	— 167.0-171.2' - moderate olive brown,	
-			6	170.7-170.8' - Bedding plane (2), <10 deg, tight, dark staining	╀	(5Y 4/4), fine grained, strong HCl reaction, weak to medium strong (R2	-
-			1	172.05' - Bedding plane, horizontal, smooth,	厂	<ul><li>to R3), voids up to 1/8" over 15-20%</li></ul>	R23: 22 minutes
-			NR	undulating, crystal traces on surface, open 1/4"	士	of surface, cavities (1/4"x1") from 168.05-168.04' poorly fossiliferous	
-	177.0			172.15' - Bedding plane, horizontal, smooth,	$\vdash$	<ul> <li>(trace molds), horizontal wavy</li> </ul>	_
1 -			6	planar, open 1/8"-1/4"		laminations (<1/16") at 170.5 No Recovery 171.2-172.0'	_
l _				172.3-172.55' - Fracture zone 173.2' - Bedding plane, horizontal, smooth,	╨	Limestone	_
1 -			0	undulating, crystals on surface of fracture,		172.0-176.2' - yellowish gray to	
1			Ľ	open 1/8" 173.3' - Bedding plane, <10 deg, smooth,		moderate olive brown, (5Y 7/2 to 5Y 4/4), strong HCl reaction, weak to	]
1 -	R24-NC			undulating, crystals covering 30% of surface,	$\vdash$	medium strong (R2 to R3), voids up	]
180	5 ft 78%	40	2	open 1/4"to 1/2" 173.45, 173.75, 173.87, 173.9, 174.0,	Ħ	to 1/8"x3/16" over 10-15% of surface, — cavities up to 1"x1/2" over 5% of	]
-137.8	1			173.43, 173.73, 173.67, 173.9, 174.0, 174.03,' - Bedding plane (6), horizontal,		surface, poorly fossiliferous (few	
1 -			>10	smooth, planar, crystals covering surface,	F	casts), mottling of slightly darker hue	
1 -				tight to open 1/8" 174.1' - Bedding plane, horizontal, smooth,	口	L up to 20% <b>No Recovery 176.2-177.0</b> '	R24: 20 minutes
1 -	102.0		NR	undulating, crystals, open 1/8"-1/4"	$\vdash$	†	-
-	182.0			174.2-174.35' - Fracture zone, 3/4" fragments			
	1						



FRACTURES PER FOOT

4

4

3

1

NR

3

3

31 3

2

4

NR

>10

>10

0

NR

0

NR

12

RQD(%)

40 6

WATER LEVELS: 1.0 ft bgs on 03/10/07

CORE RUN, LENGTH, AND RECOVERY (%)

R25-NQ

5 ft

92%

R26-NO

5 ft 96%

R27-NQ

5 ft

R28-NO

5.5 ft | 0

0%

187.0

192 0

197.0

DEPTH BELOW SURFACE AND ELEVATION (ft)

185

-142.8

190

-147<u>.8</u>

195

-152.8

200

157.8

PROJECT NUMBER:

338884.FL BORING NUMBER:

A-10 SHEET

#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724149.3 N, 457766.2 E (NAD83)

START: 2/25/2007

DESCRIPTION

DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS

175.45, 175.6, 175.8, 175.85, 175.95, 175.98,

smooth, undulating, crystals on surface, tight

177.25, 177.5, 177.55' - Bedding plane (3), horizontal, smooth, undulating, crystals on

177.65' - Bedding plane, <10 deg, smooth, undulating, open 1/4"-1/2"

177.8' - Bedding plane, horizontal, smooth,

179.0' - Bedding plane or mechanical break,

horizontal, rough, undulating, open 1/2"-1"

horizontal, rough, undulating, tight to open

180.2-180.3' - Bedding plane (2), horizontal, smooth, planar, tight to open 1/8" 180.25' - Fracture or mechanical break,

180.45' - Bedding plane, <10 deg, rough, undulating, open 1/4"-3/4" 180.6, 180.8' - Bedding plane (2), <10 deg,

182.15, 182.5, 182.6, 182.85,' - Bedding

plane (4), horizontal, smooth, undulating,

183.7, 183.77, 183.9' - Bedding plane (3).

horizontal, smooth, planar, open 1/4"-1/2"

184.4' - Bedding plane, horizontal, smooth, planar, open 1/8"-1/4"

184.45' - Bedding plane, <10 deg, smooth,

184.65' - Bedding plane, horizontal, smooth, planar, open 1/8"-1/4", dark staining

185.2' - Bedding plane or mechanical break,

<10 deg, smooth, undulating, open 1/8"-1/4" 185.6' - Fracture or mechanical break, 20

185.61' - Fracture or mechanical break, 70

187.3-187.5' - Fracture zone, rock fragments

187.55, 187.8, 187.9, 188.05' - Bedding plane

(4), <10 deg, smooth, undulating, 188.05' has

189.25' - Bedding plane or mechanical break,

black stains, open 1/4" 188.8, 188.95' - Fractures or mechanical

break (2), 40 deg, rough, undulating, tight

189.35' - Bedding plane, <10 deg, smooth,

<10 deg, rough, undulating, tight

183.25-183.35' - Fracture zone, rock

184.10-184.20' - Fracture zone, rock

184.9-185.05' - Fracture zone, rock

deg, rough, undulating, tight

deg, rough, undulating, tight

fragments up to 1-1/2" fractures

179.85' - Fracture or mechanical break,

180.05-180.15' - Fracture zone, up to 1"

vertical, smooth, undulating, tight

rough, undulating, open 1/4-1/2

tight to open 1/8"

fragments up to 1"

undulating, open 1/8"

fragments up to 2"

to 1-1/2"x1-1/5"

planar, tight

176.05' - Bedding plane (7), horizontal,

177.0-177.05' - Fracture zone

DISCONTINUITIES

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

END: 3/11/2007

90

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CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

to open 1/4"

fragments

surface, tight to 1/8"

planar, tight to open 3/4"

ORIENTATION : Vertical LOGGER: C. LeBlanc, T. Stewart, C. Wallestad LITHOLOGY COMMENTS ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS Limestone 177.0-177.95' - yellowish gray to moderate olive brown, (5Y 7/2 to 5Y 4/4), fine grained, strong HCl Driller's Remark: 183.0reaction, weak to medium strong (R2 184.5' was hard drilling, to R3), voids up to 1/8" covering 15-20% of surface, wavy dark brown laminations at 177.8' to sharp contact had to increase pump pressure (bedding plane) at 117.95', 25 degree bedding plane 177.95-180.9' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, weak to medium R25: 28 minutes strong (R2 to R3), voids up to 3/16" covering 30-40% of surface, cavities (fossil molds) up to 1"x2" covering <5% of surface, moderate fossiliferous (casts, molds), very fine grained, very pale orange (10YR 8/2) SC-7 rejected due to size wavy beds up to 1"1/2" from requirements, total of six 179.65-180.35' and 180.5-180.68' (6) special cores taken No Recovery 180.9-182.0' from boring A-10/A-10R Limestone 182.0-186.6' - yellowish gray to moderate olive brown, (5Y 7/2 to 5Y 4/4), strong HCl reaction, weak to medium strong (R2 to R3), voids up to 1/16" on 40-60% of surface, R26: 11 minutes cavities (irregular shaped) up to 3/8"x3/16" over 10-20% of surface, Driller's Remark: moderately fossiliferous (molds and Circulation regained casts) No Recovery 186.6-187.0' Limestone 187.0-188.15' - Same as 182 0-186 6' 188.15-191.8' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), weaker at bottom of interval, medium strong (R3) at base, voids up to 3/16" covering 5-15% of surface, trace cavities 3/4"-1/8" with R27: 12 minutes no infill, poorly fossiliferous, (mostly casts, molds), trace organics No Recovery 191.8-192.0' Limestone 192.0-193.25' - Same as 182.0-186.6' 193.25-194.2' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, medium strong (R3), trace black color laminations, trace very fine to fine black particles No Recovery 194.2-197.0' R28: 10 minutes End of coring at 15:21 on Limestone 3/11/07, boring grouted to 197.0-197.15' - Same as surface with Portland

11 OF 12

193.25-194.2'

No Recovery 197.15-202.5'

cement type I/II, type GU

on 3/13/07



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-10	SHEET	12	OF	12	

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724149.3 N, 457766.2 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

-	LEVELS : 1.0			3/10/07 START: 2/25/2007 END: 3/	11/20	007 LOGGER : C. LeBlanc, T. Stewar	t, C. Wallestad
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES_	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACINO
H BE ACE ATIO	TRUI VER	Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	J Z	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
EPT SURF SILEV	CORE	RQD	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	∀ME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
		ш	шш	189.95' - Bedding plane, horizontal, smooth,	0)	0.2.00.00.00	
-	202.5			⊓ planar, tight		Bottom of Boring at 202.5 ft bgs on	_
-				190.0' - Fracture zone, 60 deg, smooth, undulating, tight	ł	- 3/11/2007	-
-				190.3-190.45, 190.6-190.8' - Fracture zone	ł	-	-
-				(2), up to 2" rock fragments 191.1' - Fracture or mechanical break, 60	ł	<b>-</b>	-
-				deg, rough, undulating, open 7/8"-1" 191.35, 191.45, 191.55' - Bedding plane (3),	1	-	-
-				horizontal, smooth, undulating, open 1/8"-1/4"	1	_	
_				192.0-193.35' - Fracture zone, well graded pieces of limestone fragments 1/4"-2"	1	<b>†</b>	_
-				subangular shapes and several 3/8"-1/2" discs		<u> </u>	-
				193.1-193.4' - Fracture zone, pieces 1/4"-2"		<u> </u>	<del>-</del>
1 -				sub angular shapes and several 3/8"-1/2" discs	]		-
1 -				193.95-194.2' - Fracture zone, poorly graded	1	L	_
_				limestone, 1" subangular rock fragments			_
_				_			_
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PROJECT NUMBER:	BORING NUMBER:
338884.FL	A-11

SHEET 1 OF 15

ORIENTATION: Vertical

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8 tri-cone bit

WATER LEVELS: 1.0 ft bgs on 4/22/07				2/07	START : 4/21/2007	END: 5/9/2007	LOGGER	T. \$	Stewart, R. McComb, A. Bonilla
				STANDARD	:	SOIL DESCRIPTION		<sub>O</sub>	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				: LOG	
표원인		RECOVE	RY (ft)	120111200210		JSCS GROUP SYMBOL, COLO		SYMBOLIC	DEPTH OF CASING, DRILLING RATE,
FAY.			#TYPE	6"-6"-6"		ONTENT, RELATIVE DENSITY , SOIL STRUCTURE, MINERAL		MBC	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
SUF			#1111	(N)	·	,		SΥ	
42.5	0.0				Topsoil	-  - (NO)	_	17	
-	1	1.3	SS-1	2-2-2 (4)	diameter, organic	black, (N2), moist, roots up to s	0 3/8 / ].	ij	_
-	1.5			(4)	Poorly Graded Sa	and With Silt (SP-SM)			5' sections of NW rod, 24" split spoon (SS),
-	1.5				0.3-0.9' - pale yell	owish brown, (10YR 6/2), mo	oist,		50 lb bags of Quik Gel brand bentonite - 10:36 1/4 bag bentonite added to full mud
-	1				rounded grains, 5	ne to fine grained, silica sand % nonplastic fines, trace of v	o, verv fine		vat using 3-7/8" tricone roller bit
-	-				sand-sized black	particles	í /-I		-
-						ate yellowish brown, (10YR 5 very fine to fine grained, silio			-
-					15% nonplastic fir	nes, trace very fine grained p	oarticles   -		-
-	-				of a dark yellowish particles	n orange and very fine graine	ed black		-
-					particles				-
5	5.0							~~	
37.5				6.6.4	Clayey Sand (SC)	) e green, (5BG 7/2), wet, loos	se 16% -		_
1 _		1.0	SS-2	6-6-4 (10)	medium plastic fin	nes, silica sand, trace very fin	ne 🕻		_
	6.5			( - /	sand-sized black	particles, brownish black stai e of coarse sand-sized yellov	ining /		
					gray (5Y 8/1) parti	icles, trace 1/8" rootlets, brov			
-	1				black staining aro	und rootlets			_
-	1						1		-
-	1						-		-
-									Driller's Remark: 8.5' below ground surface
-	1						-		change in drilling -
	-								9.5' stiffened up (harder drilling)
10 32.5	10.0 10.3	0.3	SS-3	50/3	Lean Clay With S	ilt (CL-ML)		ат	— —
-		0.5	00-0	(50/3")	/ \ 10.0-10.25' - Sam	e as 5.0-6.0' except hard, no	, / <del> </del>	71.1	-
-					organics		/ -		-
-							4		-
_							_		_
l _									_
1 _									Driller's Remark: 12.5' started losing water
l _									
							1		
1 -	]								Hard at 14.0', approximately 40-50%
15	15.0						1		circulation loss, add 1/2 bag bentonite then added another 1/8 bag to mud vat
27.5	15.3	0.1	SS-4	50/4	Limestone Fragm	nents			
-				(50/4")	15.0-15.3' - grayis	th to dusky yellow, (5Y 8/4 to erate HCl reaction, 20-30% ve	o 5Y		<del>-</del>
-					<1/8" in size, sphe	erical to elongated in shape,	trace		-
-						y fine grained particles, voids	s are   -		-
-					possible microfos	9119			-
-									-
-							-		-
-							4		-
-							4		-
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20									
1									



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-11	SHEET	2	OF	15

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8 tri-cone bit

DRILLIN	G METH	OD AND	EQUIPM	ENT : CME 550 S	S/N 186073, mud rotary, cathead, NW rods, 3-7/8 tri-c	cone bit		ORIENTATION : Vertical	
WATER	LEVELS	: 1.0 ft bo	gs on 4/2:	2/07	START : 4/21/2007 END : 5/9/2007	LOGGER	: T.	Stewart, R. McComb, A. Bonilla	
				STANDARD	SOIL DESCRIPTION		(n	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			SYMBOLIC LOG		
H H		RECOVE	ERY (ft)	ILST KESOLIS	SOIL NAME, USCS GROUP SYMBOL, CO		LIC.	DEPTH OF CASING, DRILLING RATE,	
YHA VAT				6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSIT CONSISTENCY, SOIL STRUCTURE, MINER		MBC	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
			#TYPE	(N)			SYI		
22.5	20.0	0.3	SS-5	50/5	ຸ Silty Sand With Gravel (SM)		111		
_				(50/5")	20.0-20.25' - grayish to duský yellow, (5Y 8/4 6/4), wet, very dense, fine to coarse grained,	l to 5Y   -	l		
-					moderate HCl reaction, 20% nonplastic fines	s. 15-20% / -	l		
-					fine gravel-sized to 3/4", all carbonate		l		
_						-			
_						_	l	Drillaria Damanic Hand at 22 51 than your act	
_						_		Driller's Remark: Hard at 22.5' then very soft drilling from 23.0-25.0'	
_						_	l		
_						_			
25	25.0					_	1		
17.5					Silt With Sand (ML)				
_		1.1	SS-6	35-34-20	25.0-26.1' - dusky yellow, (5Y 6/4), trace whit mottling, moist to wet, dense, nonplastic, rap				
-	26.5			(54)	dilatancy, mild to moderate HCl reaction, 159	% very ┌	ш	•	
-	26.5				fine sand-sized, 5-10% fine to medium sand-		l		
-					\trace fine sand-sized brilliant green particles	, ali / -	l	Driller's Remark: Hard at 27.0'	
_							l	Briller e Remark. Hard at 27.9	
_						_	1		
_						_			
_						_			
_						_	l	Driller's Remark: Soft again at 29.0'	
30	30.0								
12.5					Silt With Sand (ML)		Ш		
		1.2	SS-7	40-30-34 (64)	30.0-31.15' - Same as 25.00-26.1' except ler very fine grain sized limestone	ises oi –	Ш		
_	31.5			(04)	, ,		ш		
_	01.0					_	İ		
-						_	l		
_						-	l		
-						-	l		
-						-	l	Driller's Remark: Hard at 33.5'	
-						-		Driller's Remark: Last foot of run 34.0-35.0'	
-						-		is drilling at 2.5 minutes per inch with 400 ps	
35 7.5	35.9	0.1	\ SS-8 /	50/1	│ Limestone Fragments		<u> </u>	pressure applied Driller's Remark: Approximately 20 minutes	
ر.ن –		0.1	<u> </u>	50/1 (50/1")	→ 35.0-35.05' - light olive gray to moderate olive	e brown, /_		to drill 34.0-35.0'	
_					(5Y 5/2 to 5Y 4/4), coarse grained, mild HCl	reaction, /_		Driller's Remark: Will switch over to NQ	
_					very poor recovery Begin Rock Coring at 35.5 ft bgs		l	coring assembly	
_					See the next sheet for the rock core log	_			
_						_			
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40						-	l		
40							$\vdash$		
								•	



PROJECT NUMBER: BORING NUMBER: 338884.FL A-11 SHEET 3 OF 15

#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88)  $DRILLING \underline{\ CONTRACTOR: Universal\ Engineering\ Sciences,\ Gainesville,\ FL;\ Driller:\ M.\ Boatright;\ Cathead\ Operator:\ G.\ Davis$ 

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION: Vertical WATER LEVELS: 1.0 ft bgs on 4/22/07 START: 4/21/2007 END: 5/9/2007 LOGGER: T. Stewart, R. McComb, A. Bonilla LITHOLOGY DISCONTINUITIES COMMENTS DEPTH BELOW SURFACE AND ELEVATION (ft) 90 CORE RUN, LENGTH, AND RECOVERY (%) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS Limestone 3" NW set to 35.5' below 0 35.5-40.3' - light olive gray to ground surface using moderate olive brown with yellowish gray mottling, (5Y 5/2 to 5Y 4/4 with casing advancer Start R1 at 15:56 36.75, 38.0' - Mechanical break (2) 0 5Y 7/2), mild to moderate HCI Added 1/4 bag bentonite to reaction, very weak (R1), strength decreasing with depth, 35.5 to 37.0' full mud vat R1-NQ medium strong (R3), poorly fossiliferous (casts), trace black particles and short 3/8" discontinuous 93 1 5 ft Driller's Remark: Soft at 96% 38.35' - Fracture, 50 deg, rough, undulating, 38.0' 2 laminations, 1/8" voids over 20-30% 38.8, 39.2' - Fracture (2), 50 deg, rough, of surface, fossiliferous up to 3/4" undulating, tight R1: 5 minutes 40 1 2.5 40.5 40.2' - Fracture, 60 deg, rough, undulating, NR No Recovery 40.3-40.5' tight Limestone >10 40.5-40.75' - Fracture zone 40.5-43.4' - Same as 35.50-40.3' except some void infilling with soft gray (N4) fine material >10 41.95-42.3' - Fracture zone, tight R2-NC 3 35 5 ft 58% 42.85' - Fracture, 60-70 deg, rough, undulating, tight No Recovery 43.4-45.5' 42.95' - Mechanical break, horizontal, rough, undulating, tight 43.0, 43.1' - Fracture (2), horizontal, rough, NR R2: 3 minutes undulating, tight 45 -2.545.5 45.5-48.2' - Fracture zone Limestone 45.5-48.5' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), mild to moderate HCl reaction, >10 >10 45.5-45.8' carbonate silts 46.0-46.7' extremely weak rock (R0), 47.15' - Mechanical break, <1/32" soft silt 47.5' Started losing water Driller's Remark: Will set 5' infill over 25-35% of surface crumbles under thumb pressure R3-NQ 47.9-48.2' fractured zone, spherical 5 ft 23 >10 47.9-48.2' - Fracture zone, 2-1/2"-3" 60% 1/16" voids up to 35% of surface, more 3" NW casing crumbled core fragments poorly fossiliferous (casts up to 3/4"), 1/2" elongate trace cavities with no infill, trace medium grained black NR particles (organics), similar to R3: 3 minutes 50 35.5-45.5 -7.5 No Recovery 48.5-50.5' 50.5 Limestone 50.5-54.55' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), mild to moderate HCl reaction, 1 51.05, 51.7, 51.9, 53.9' - Mechanical break or bedding plane (4), horizontal, rough, undulating, tight, except 51.05' is open up to medium strong (R3), extremely weak rock (R0) at 53.9', 1/16" voids (90% are under 1/16", 10% are 1/8" 2 1-1/2" 52.5' - Mechanical break, tight R4-NQ 75 1 spheroidal) up to 25-30% of surface, 5 ft 81% moderately fossiliferous (casts up to 53.25' - Bedding plane or mechanical break, 1/2" in sizé) 0-10 deg, rough, undulating, tight 1 R4: 5 minutes No Recovery 54.55-55.5' NR -12.5 55.5



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

				IENT . CIVIE 330 3/N 1800/3, Mud Totally, INQ 10018, INV			ORIENTATION: Vertical
WATER	LEVELS : 1.0	ft bgs	s on 4		9/2007	· · · · · · · · · · · · · · · · · · ·	
200	(9)			DISCONTINUITIES	၂ ၂	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OUTE AND DEDTIL OF CASSIVE
ᆱ႘ᅙ	AUN H,A	(%) Q	NE		일	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F A Y	SE F SOV	) D	Z F	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	/BC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SEE	COF	a a	FR/	THICKNESS, SURFACE STAINING, AND TIGHTNESS	l S N	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				55.5' - Bedding plane or mechanical break,	H	Limestone	Approximately 1.0' below
_			2	horizontal, rough, planar, tight	口	- 55.5-60.5' - light olive gray to	ground surface water level, -
I _				56.35, 57.15, 57.6, 58.3, 59.25' - Bedding	Н	moderate olive brown, (5Y 5/2 to 5Y	core run ended at 8:07,
				plane or mechanical break (5), horizontal,		4/4), mild to moderate HCl reaction,	first core run on 4/22/07
			1	rough, undulating, tight to 1" open	Н	<ul> <li>very weak (R1), 1/16" spheroidal voids up to 30% of surface,</li> </ul>	T. Stewart/A. Bonilla are - the loggers.
-	R5-NQ					moderately fossiliferous (cast up to	and loggere.
-	5 ft	87	2		╨	3/8"), trace black particles (possibly	-
-	100%				╁┼┼	organics)	_
_			1		П	_	_
			'		Н		
60					ш	-	R5: 6 minutes
-17.5			0	_	╁┼		_
-	60.5				世	- 60.5-65.5' - light olive gray to	-
-			1		₽₽	- moderate olive brown, (5Y 5/2 to 5Y	-
				61.1, 62.0, 63.45' - Mechanical break or	Ш	4/4), mild to moderate HCl reaction,	SC-1 collected at 61.1-62'
				bedding plane (3), horizontal, rough, undulating, tight		very weak (R1), voids (<1/16")	
-			1	undulating, tight	╁┼	<ul> <li>20-25% of surface, poorly fossiliferous (casts up to 1/16"</li> </ul>	_
_	R6-NQ			62.4, 62.7, 63.0, 65.1, 65.4' - Mechanical	口	elongated), trace black particles,	-
-	5 ft	100	1	break (5), tight	+ + +	10%-15% organics as medium grain	-
_	100%					particles and laminations under 1/16" thick horizontally aligned, medium	-
			0		┵	strong rock (R3), stress joints over	_
						61.0-62.0' vertically oriented	
65					Н	-	R6: 9 minutes
-22.5	05.5		0	_		<del></del>	_
-	65.5				╁┼┼	Limestone	T. Stewart is the logger.
-			0		田	- 65.5-70.3' - light olive gray to	-
_					$\bot$	moderate olive brown, (5Ý 5/2 to 5Y	_
			2	66.7' - Fracture, 40 deg, rough, undulating,		4/4), mild HCl reaction, medium strong (R3), 1/8" voids on 15-20% of	
				tight	Ш	surface, some voids filled with hard,	1
-	R7-NQ			67.35' - Mechanical break or bedding plane,	+	medium gray (N5) mineralization,	-
-	5 ft	93	1	horizontal, rough, undulating, open up to 1/2"		poorly fossiliferous (casts up to 1/8"	-
-	96%			68.3' - Fracture, vertical, rough, undulating,	╂┴╂	elongated)	-
_			1	tight	П	-	-
				68.65' - Fracture, 55-60 deg, rough, undulating, tight	$\mathbb{H}$	_	
70			1	69.4' - Mechanical break, horizontal, rough,	口		R7: 10 minutes
-27.5	70.5			undulating, tight	₩		
-	70.0		NR)	70.05' - Fracture, 50-60 deg, rough, undulating, tight	口	No Recovery 70.3-70.5'	<del>-</del>
-			5	70.6, 70.7, 70.8, 70.85, 71.5' - Mechanical	╂┼┼	Limestone 70.5-74.1' - light olive gray mottled	-
_				break or bedding plane, horizontal, rough,	口	<ul> <li>with olive gray, (5Y 5/2 with 5Y 3/2),</li> </ul>	-
			2	undulating, tight 10 1/8" open	Щ	mild to moderate HCl reaction,	]
				71.2' - Fracture, 50 deg, rough, undulating, tight		strong (R4), extremely weak rock at top of sample, 1/16" voids on 10-15%	
1 7	R8-NQ			71.7' - Fracture, 30-40 deg, rough,	$\Box$	of surface, poorly fossiliferous, casts	]
-	5 ft	40	2	undulating, carbonate silt infill over 100%	╁┼┼	up to 1/2"	-
-	72%		<u> </u>	surface 1/16" thick 72.1' - Fracture or mechanical break.	口	-	73.5' Got soft, hard again
-			1	horizontal, up to 3/8" open	╀┼	-	at 75.0'
				72.8' - Fracture or mechanical break,	口	No Recovery 74.1-75.5'	<b> </b>
75			NR	horizontal, rough, undulating, open 1/4"	Н		R8: 12 minutes
-32.5	75.5			73.1' - Bedding plane or mechanical break, — horizontal, rough, undulating, open 1/4"	Ш	<del>_</del>	-
	. 5.5			nonzontal, rough, undulating, open 1/4	1 1		
					1 1		
					1		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-11 SHEET 5 OF 15

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS : 1.0	ft bg	s on 4	22/07 START : 4/21/2007 END : 5/	9/200	LOGGER : T. Stewart, R. McCon	nb, A. Bonilla
₹D.€	(%)			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
DE	CC RE	R	>10	THICKNESS, SURFACE STAINING, AND TIGHTNESS  73.9' - Fracture, 70-80 deg, rough, undulating, tight 75.5-75.85' - Fracture zone, rock fragments	λs —	CHARACTERISTICS  Limestone - 75.5-79.5' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), black	T. Stewart/A. Bonilla are the loggers
-	R9-NQ		1	3/4", sub-angular, some granular mineralization on surface 77.1' - Fracture, 15-20 deg, rough, undulating, tight, black stains on 90% of		mottling, strong HCl reaction, strong  (R4), 1/8" spheroidal voids on 10-15% of surface, poorly fossiliferous (casts up to 5/16"), trace	- - -
-	5 ft 80%	62	3	surface 77.6, 77.7, 77.9' - Fracture, horizontal, rough, undulating, open up to 1/4"		<ul> <li>cavities up to 1" elongate and horizontally aligned, no infill in voids or cavities, black 1/16" horizontal</li> </ul>	SC-2 collected at 78.5-
80_ -37.5			2 NR	78.4-78.5 - Fracture zone, rough, undulating, 1/16"-1/32" thick infill of very soft carbonate fines		<ul> <li>laminations, vertical stress joints near 79', fractures with secondary black mineralization infill near 77.2'</li> <li>No Recovery 79.5-80.5'</li> </ul>	R9: 15 minutes  Driller's Remark: Will set
-01.0	80.5		2	80.85' - Bedding plane or fracture, 0-5 deg, rough, undulating, brownish black stains over	Ħ	Limestone  - 80.5-85.5' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild	3" NW casing from 45.5- 75.5' below ground surface Start R-10 at 11:36, observed 50-60% core loss
- -	R10-NQ		4	100% surface, open 1/4" 81.35, 81.55, 81.65, 81.8' - Bedding plane or mechanical break, horizontal, rough, planar, open up to 1/8"		HCl reaction, medium strong (R3), weathered, spheroidal 1/8" voids up to 30% of surface, poorly fossiliferous (casts up to 1/2"), some	
_	100%	82	0	82.0, 82.95' - Bedding plane or mechanical break (2), horizontal, rough, undulating, tight to 1/4" open 82.8' - Bedding plane or mechanical break,		secondary mineral infill (yellowish gray 5Y 8/1 in color), trace coarse grained sized black particles  (organics)	- - -
85_ -42.5	85.5		1	horizontal, rough, undulating, organic layers <1/16" thick, apparent weathering 83.2' - Mechanical break, tight 84.4' - Fracture, 80-90 deg, rough,		- -	R10: 8 minutes Add 1/4 bag bentonite to — mud vat
-	00.0		0	undulating, tight 85.45, 85.6' - Fracture (2), 50-60 deg, rough, undulating		85.5-90.5' - light olive gray, (5Y 5/2),  moderate HCl reaction, medium strong (R3), spheroidal 1/8" voids up to 15-20% of surface, moderately	
_	R11-NQ		0	87.6' - Bedding plane, horizontal, rough,		fossiliferous (mostly casts of echinoderma up to 5/8", white whole fossils and fragments up to 3/4" in	-
-	5 ft 100%	85	0	undulating, brownish black infill 1/16" thick over 85% of surface 87.75' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/16"-1/8"		size over bottom 89.5-90.5', 3-7% medium to coarse grained black fragments (organics) also as 3/8" long discontinuous laminations less	- -
90_ -47.5	90.5		0	88.0, 88.15' - Fracture (2), horizontal, rough, undulating, 1/8"-1" open 88.95, 89.5' - Mechanical break (2), tight		than 3/8" thick, also spiral and conical shaped casts up to 3/16"	R11: 6 minutes SC-3 collected at 89.5- 90.5'
-			0		Ħ	90.5-95.5' - yellowish gray with - yellowish gray bedding, (5Y 8/1 with 5Y 7/2), silt-sized black particles, 1/16" yoids on 20-25% of surface.	14:12 Mix 1/8 bag mud to vat -
-	R12-NQ		1	91.65' - Bedding plane or mechanical break, rough, undulating, tight  92.55' - Mechanical break, 3-5 deg, rough,	Ħ	<ul> <li>highly fossiliferous toward bottom 1/3 of sample (casts and whole fossils) microforams and fossil fragments</li> </ul>	-
-	5 ft 100%	87	3	undulating, tight 93.0' - Bedding plane, horizontal, smooth, planar, tight, possibly organic layer 93.6' - Fracture, 10-20 deg, rough,	Ħ	<ul> <li>range from medium to coarse sand-sized particles, oval shaped fossils approximately 1/8", spiral shaped fossils</li> </ul>	
95 <u> </u>	95.5		>10	undulating, 1/8" open 93.85, 94.3' - Fracture, 50-60 deg, rough, undulating, tight —		_	R12: 15 minutes
	- 5.0						



PROJECT NUMBER: BORING NUMBER:

338884.FL A-11

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS : 1.0	) ft bgs	s on 4	/22/07 START : 4/21/2007 END : 5/	9/200	7 LOGGER : T. Stewart, R. McCon	nb, A. Bonilla								
>00	(9			DISCONTINUITIES	ß	LITHOLOGY	COMMENTS								
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.								
-			3 >10	94.45' - Fracture, 80-90 deg, rough, undulating, tight 94.8-95.2' - Fracture zone 95.55, 95.7, 96.75' - Bedding plane or mechanical break, horizontal, rough,		Limestone  95.5-100.5' - yellowish gray (5Y 7/2), strong HCl reaction, very weak rock (R1), highly fossiliferous (casts, molds up to 1/2", microforams), trace	T. Stewart is the logger.								
- - -	0 .5 100.5 - - - - - - - - - - - - -	43	>10	undulating 97.5-98.2' - Fracture zone, vertical 98.55' - Fracture, 5-10 deg, rough,		organics as coarse particles and 3/4" long/1/16" wide laminations, trace cavities rimmed with secondary mineralization, elongated 3/16"x1/16", 25% medium dark gray	- - -								
- 100 -57.5				<u> </u>								0	undulating, tight 98.65, 98.8' - Mechanical break (2), tight 99.0' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/8" open	(N4) particles in rock matrix 95.5-98.4' friable in places due to	R13: 6 minutes —
- - -		0		102.0. 102.35' - Mechanical break or bedding		weak rock (R0) 100.5-105.2' - yellowish gray (5Y 7/2), same sequence as R-13; spiral casts/molded (1/2"-5/8" size) in upper half (100.5-103.0'); less	Driller's Remark: Will set 3" NW casing (25' more)								
- - -		82	1 0	plane (2), 3-5 deg, rough, undulating, open up to 1/8"  102.6' - Bedding plane or mechanical break, horizontal, rough, undulating		casts/molds in lower half, trace light olive gray (5Y 5/2) mottling at 104.0' in lower half (103.0-105.2'), upper half of R-14 not friable as is R-13	Last core run on 4/22/07								
- 105_ -62.5	105.5		0 NR			_  _ No Recovery 105.2-105.5'	R14: 8 minutes —								
- - -	R15-NQ		>10	105.5-106.1' - Fracture zone, fragments up to 2"  106.85' - Fracture, 60-70 deg, rough, undulating, tight 106.95' - Fracture, 20-30 deg, rough,		Limestone  105.5-110.4' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, 1/16" spheroidal voids on 20-30% of surface, moderate to highly fossiliferous (casts, molds up to 1-1/2" long), majority of voids over	8:05 Start first core run of 4/23/07 - Unable to get water level before coring start due to coring barrel being hung over night -								
-	5 ft 98%	82	2	undulating, tight 107.9, 109.05, 109.15' - Mechanical break or bedding plane (3), horizontal, rough, planar to undulating, open to 1/16"		<ul> <li>first 2.5', rest of sample is 5-10%</li> <li>voids, trace irregular shaped casts up to 1/2" over first 2.5', no cavities</li> <li>below 107.9'; 15-20% medium grained medium dark gray particles in rock matrix, microforams up to</li> </ul>	- - - R15: 10 minutes								
110 <u> </u>	110.5		0 (NR) 0	- - -		— 1/32", oval and spherical shaped molds/casts and very fine to fine grained (shell fragments) angular     white particles     No Recovery 110.4-110.5' Limestone									
- - -	R16-NG 5 ft 100%	97	1	112.15, 112.3' - Mechanical break or bedding plane (2), horizontal, rough, undulating, tight 113.0' - Mechanical break, tight 113.25' - Mechanical break or bedding plane,		110.5-115.5' - Same as 105.5-110.4' except 1/16" spheroidal voids on 5-15% of surface, trace cavities up to 5/8" elongated - rimmed with yellowish gray (5Y 8/1) secondary mineralization, some cavities	- - - -								
- 115 -72.5	115.5		0	horizontal, rough, planar, open to 1/16"		_ horizontally aligned in a 1/2" bed at 114.0' _ 	R16: 10 minutes								



PROJECT NUMBER: BORING NUMBER: 338884.FL A-11 SHEET 7 OF 15

#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88)  $DRILLING \underline{\ CONTRACTOR: Universal\ Engineering\ Sciences,\ Gainesville,\ FL;\ Driller:\ M.\ Boatright;\ Cathead\ Operator:\ G.\ Davis$ 

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION: Vertical WATER LEVELS: 1.0 ft bgs on 4/22/07 START: 4/21/2007 END: 5/9/2007 LOGGER: T. Stewart, R. McComb, A. Bonilla DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD <u>∪</u> MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS Limestone 0 115.5-120.5' - yellowish gray, (5Y SC-4 collected at 115.5-7/2), strong HCl reaction, very weak to extremely weak (R1 to R0), very 116.55 116.55, 116.7' - Bedding plane or mechanical fossiliferous (casts, molds, microforams), trace cavities with medium dark gray infill up to 1-1/4", 25-35% medium to coarse grained >10 break, horizontal, rough, undulating, tight to open 1/4" R17-NQ 116.55-117.3' - Fracture zone 40 >10 5 ft medium dark gray particles in rock 100% 118.15-118.45' - Fracture zone 118.5, 118.65, 118.8, 188.95, 119.2' matrix, gray mottling in matrix at 7 Bedding plane or mechanical break (5), 119.0' horizontal, rough, undulating, tight to open R17: 9 minutes 120 2 119.45' - Fractures (2), horizontal and -77.5 vertical, rough, undulating, perpendicular, 120.5 tiaht No Recovery 120.5-121.0' 9:25 Add 1/4 bag bentonite NR 119.6, 119.8' - Bedding plane or mechanical break (2), 0-5 deg, rough, planar, tight after emptying mud vat and Carbonate Silt With Silica Sand 1 refilling (ML) 121.0-121.2' - grayish yellow, (5Y 7/2), wet, strong HCl reaction, 121.2' - Bedding plane, horizontal, cohesive silt infill on surface, 1/4" thick 1 121.8, 122.8' - Mechanical break (2), tight 15-25% very fine to fine grained, R18-NO clear, subrounded, silica sands, 70 1 5 ft 90% 3-7% very fine to fine grained dark yellowish orange (10YR 6/6) and light 123.2' - Bedding plane or mechanical break, horizontal, rough, undulating, open 3/8" 123.6, 123.63, 123.65, 123.7, 123.75, 123.8, 124.0, 124.02' - Bedding plane or mechanical brown (5YR 5/6) particles 6 Limestone 121.2-125.5' - yellowish gray, (5Y break (8), horizontal, rough, planar, tight, R18: 13 minutes 125 7/2), strong HCI reaction, very 0 dark surfaces, possibly bedding plane of dark fossiliferous (microforams, fossil -82.5 125.5 material casts and molds), thinly bedded near 123.5-124.0' with olive gray staining, 1 organic odor from crumbled rock, friable from 121.2' to 123.0', trace 126.4, 127.05' - Bedding plane or mechanical cavities up to 3/4" some with white break (2), horizontal, rough, undulating, tight 2 mineralization as 50% infill (rimmed), to 1/4" open medium dark gray medium to coarse grained on 25-35% of rock matrix 127.5-127.65' - Fracture zone, rock R19-NQ 5 77 fragments 5 ft 125.5-130.5' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak 100% 128.0-128.15' - Fracture zone, angular rock fragments, 1/2"-5/8" (R1), voids (<1/16") over 15-20% (mostly over top 3'), 1/16"x3/16" 128.25, 128.35, 129.0' - Fracture (3), 1 open up to 3/4", cavity infilled with gray material at 129' horizontal and vertical, rough, undulating, elongated trace cavities horizontally R19: 10 minutes aligned, cavities in lower 2' have 130 >10 white secondary mineralization -87.5 129.35' - Bedding plane, 10-15 deg, open 130.5 rimming the outside of the 3/4" void/cavity, medium dark gray 130.0-130.5' - Fracture zone, vertical 6 particles up to 10% of rock matrix, 130.55' - Mechanical break or bedding plane, trace medium gray cavities up to 3/4" horizontal, smooth, undulating, open 1/8" and to trace medium grained black 131.0' - Mechanical break or bedding plane, 4 particles/organics throughout entire horizontal, rough, undulating 131.3, 131.35, 131.4, 131.5, 131.6, 131.65, 131.7, 131.8' - Bedding plane or mechanical run; R-19 is highly fossiliferous (microforams and casts/molds) R20-NQ 1 5 ft 65 break (8), horizontal, rough, undulating, open 98% 132.1, 133.0' - Mechanical break (2), tight 5 132.55' - Bedding plane or mechanical break, horizontal, rough, planar R20: 11 minutes 135 2 133.0' - Mechanical break, tight -92.5 135.5



PROJECT NUMBER:

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BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, NW casing

				LENT : CIVIL 330 3/N 100073, Hidd Hotaly, ING tools, NVV		,	
WATER	LEVELS : 1.0	) ft bgs	on 4		9/2007		
⊋Q⊋	(%			DISCONTINUITIES	ဗ္ဂ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
불병은	DY.F.R	(%) Q	7UR 00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,		MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
₽₽₩	RE 200	αD	ACT R F(	PLANARITY, INFILLING MATERIAL AND	MB(	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SUB	SÄÄ	R	FR/ PEI	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
			NR/	133.6' - Bedding plane, 0-5 deg, rough,		Limestone	
_			1	undulating, tight	$\vdash$	- 130.5-133.65' - yellowish gray, (5Y	_
_				134.1, 134.35, 134.45, 134.5, 134.8' -	₽	_ 7/2), strong HCl reaction, very weak	_
			1	Bedding plane (5), horizontal, rough, planar, open 1/16"		to weak (R1 to R2), grades from a  very lightly fossiliferous	
			'	134.6' - Bedding plane, 0-5 deg, rough,	$\vdash$	(microforams, molds) to a thinly	_
-	R21-NC			undulating, open to 1/16"		bedded and laminated very fine	-
-	5 ft	72	1	135.75' - Bedding plane or mechanical break,	ш	grained limestone.	SC-5 collected at 138-
_	94%			horizontal, rough, undulating, open 1/2" 137.1' - Fracture, 70 deg, rough, undulating,	+	130.5-133.65': echinoid and	138.85'
<u> </u>			1	tight		microform rich, trace elongated - cavities rimmed with white hard	_
			'	138.0' - Bedding plane or mechanical break,	Н	mineralization 3/8"x1/8", up to 25%	
140			>10	horizontal, rough, planar, tight		medium grained medium dark gray	R21: 10 minutes
-97.5				138.85' - Mechanical break —	+	— (N4) particles in matrix; very fine	Driller's Remark: 139.5' —
1 -	140.5		NR	139.2' - Bedding plane or mechanical break, horizontal, rough, planar, top of fractured		grained wavy thinly bedded discontinuity at 133.65'	Started losing water rapidly _
1 -			>10	zone, 2" open	Ш	133.65-135.4' - yellowish gray to light	_
1			10	139.5' - Fracture, vertical, rough, undulating	$\vdash$	olive gray, (5Y 7/2 to 5Y 5/2), thinly	
_				139.65-139.9' - Fracture zone, subrounded		bedded to laminated and alternating	_
-			2	1/2"- 1-1/8" fragments, black stains over 80% . of surface	₩	<ul> <li>beds, wavy thinly bedded discontinuity at 135.2' (load</li> </ul>	-
-	D00 N0			139.95' - Fracture, 70-80 deg, rough,	+	structures) interval, microforams,	_
_	R22-NG 5 ft	80	2	undulating, black stains over 25% of surface,		_ medium dark gray (N4) particles as	_
	100%			tight		above	SC-6 collected at 143.1-
_				140.15-141.25' - Fracture zone, brownish black staining on fragments, possibly		No Recovery 135.4-135.5' Limestone	143.9'
-			1	weathered	$\vdash$	135.5-139.2' - yellowish gray to	Driller's Remark: 50-75%
-				142.1' - Bedding plane, 10 deg, smooth,		yellowish gray, (5Y 7/2 to 5Y 8/1),	circulation loss -
145 -102.5			1	undulating, organic layer, 1/16"	ш	very fine grained, strong HCl	R22: 8 minutes
-102.5	145.5			142.4-142.5' - Fracture zone, brownish black stains over 40% surface	Н	reaction, medium dark gray (N4) particles on 15-20% of surface, trace	
				143.1' - Bedding plane, horizontal, rough,		olive gray (5Y 3/2) laminations and	
_			1	undulating, brownish black stains over 80%	Н	wavy bedded discontinuities at 137.5'	
-				surface, 1/16" open		- 139.2-140.2' - strong HCl reaction,	-
_			0	143.9' - Bedding plane, 0-5 deg, rough, stepped, tight	+	strong (R4), white with yellowish gray (5Y 8/1) cavity infilling, 1-1/2"	-
_				145.2' - Bedding plane or mechanical break,		- irregularly shaped cavities, poorly	_
	R23-NC		0	0-9 deg, rough, undulating, 1/4"	ш	fossiliferous (casts-spiral shaped up	
1	5 ft 100%	100	U	146.4' - Bedding plane or mechanical break,	$\Box$	to 3/4" length), trace medium grained	1
1 -				horizontal, rough, undulating, tight		<ul> <li>black particles (organics)</li> <li>No Recovery 140.2-140.5'</li> </ul>	-
1 -			2	148.0, 148.35, 148.5' - Mechanical break, tight	╂┼┤	_ No Recovery 140.2-140.5 Limestone	-
1 -				148.9' - Bedding plane, horizontal, 3/8" infill		- 140.5-143.1' - Same as 139.2-140.2'	D23: 9 minutes
150_			1	149.0' - Bedding plane, 0-10 deg, rough,	$\vdash$	except mottled light gray (N7) over	R23: 8 minutes
-107.5	150.5		'	undulating, tight to 1/4" open		40% of run, trace organics as wavy	
1 -				150.0' - Fracture, 60 deg, rough, undulating, tight	$\Box$	<ul> <li>laminations 3/16", 1/16" spheroidal voids infilled 10-15%</li> </ul>	-
-			3	150.7' - Fracture, 70 deg, rough, undulating,	+	143.1-145.5' - yellowish gray, (5Y	-
-				tight		<ul> <li>7/2), strong HCl reaction, strong</li> </ul>	-
1 -			4	141.4, 151.5' - Bedding plane (2), horizontal,	₽	(R4), bedded, up to 1/8" voids up to	-
				rough, planar, tight 151.65' - Bedding plane, horizontal, rough,		25% of surface (may be microforams as casts), trace casts of echinoderm	
1 -	R24-NC			planar, open 3/4", infill of soft fines	$\vdash$	fragments, wavy laminations	1
1 -	5 ft 96%	38	1	152.15, 152.45' - Bedding plane (2),		<sup>-</sup> 145.5-149.0' - yellowish gray, (5Y	-
-	90%			horizontal and 5 deg, rough, undulating, open .	μП	<ul> <li>7/2), strong HCl reaction, medium grained texture, 5-10% elongated</li> </ul>	-
1 -			4	1/16"-3/8", silt infill at 152.15 152.75' - Fracture, horizontal, rough,	$\vdash$	cavities (up to 3/4"x1/8") horizontally	-
1 -				undulating, tight to open 1/4"	口	aligned and infilled with hard medium	l
155			5	153.6-154.95' - Bedding plane (9), horizontal,	$\vdash$	to light gray (N6) mineral, trace voids	R24: 7 minutes
-112.5	155.5			rough, undulating to planar, 1/16"-1/4" open	Ш	1/8"x1/16" rimmed with white mineral	
-	100.0						
1							



FRACTURES PER FOOT

NR

NR

NA

2

0

0

2

5 57 5 ft

4

3

NR

2

3

2

2

4

1

3

4

3

open

tight

open

undulating

surface

tight

RQD(%)

0

WATER LEVELS: 1.0 ft bgs on 4/22/07

CORE RUN, LENGTH, AND RECOVERY (%)

R25-NQ

5 ft

64%

R26-NO

93%

R27-NQ

5 ft 100%

R28-NQ

5 ft 54

98%

75 1

DEPTH BELOW SURFACE AND ELEVATION (ft)

160

-117.5

165

-122.5

170

-127<u>.5</u>

-132.5

175.5

170.5

165.5

160.5

PROJECT NUMBER: BORING NUMBER: 338884.FL A-11 SHEET 9 OF 15

#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88)  $DRILLING \underline{\ CONTRACTOR: Universal\ Engineering\ Sciences,\ Gainesville,\ FL;\ Driller:\ M.\ Boatright;\ Cathead\ Operator:\ G.\ Davis$ 

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION: Vertical START: 4/21/2007 END: 5/9/2007 LOGGER: T. Stewart, R. McComb, A. Bonilla LITHOLOGY DISCONTINUITIES COMMENTS 90 DESCRIPTION ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD <u>∪</u> MINERALOGY, TEXTURE, WEATHERING, HARDNESS, DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS T. Stewart/R. McComb are Limestone 149.0-150.5' - light olive gray, (5Y the loggers. 5/2), strong HCl reaction, medium strong to strong (R3 to R4), 1/16" Driller's Remark: Will add 3" NW casing to seal off voids on 5-10% of surface, trace cavities up to 3/16"x3/16" with sand grayish yellow (5Y 8/1) infill, poorly Driller's Remark: 100% fossiliferous (casts up to 3/8") circulation loss 150.5-153.6' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, On the field log the interval that was not recovered weak to medium strong (R2 to R3), (155.5-157.3') appears to dusky yellowish brown (10YR 2/2) be from the top of the core wavy laminations, trace of medium R25: 14 minutes grained organics in laminations 159.9' - Bedding plane, 0-10 deg, rough, SC-7 collected at 160.5-153.6-155.3' - light olive gray, (5Y 5/2), strong HCl reaction, medium planar, contact with silica sand above 161.6' 160.1' - Bedding plane, 10 deg 9:49. 5/1/07 Water level strong to very weak (R3 to R1), very 4.5' below ground surface 7:50, 5/8/07 Water level fossiliferous (microforams), very similar to 145.5-149.0', medium to approximately 3' below 161.6, 162.4, 162.57' - Fracture (3), coarse grained plate-like angular horizontal, rough, undulating, tight ground surface fragments, yellowish gray (5Y 8/1) in Offset approximately 10' to color west of A-11 and drill A-162.75, 162.95, 163.0, 163.35, 164.25, 164.3, No Recovery 155.3-157.3' 11R, lost bit in A-11; tried 164.5, 164.6, 164.73, 164.92' - Fracture (10), Poorly Graded Silica Sand (SP) fishing for bit on 5/6/07 to horizontal, smooth, planar, open 157.3-159.9' - loose, fine grained, no avail; offset A-11 on 163.65' - Fracture, horizontal, rough, mild to moderate HCl reaction, clear, 5/7/07, drilled 4-7/8" stepped, open subrounded sands with trace borehole to 160', set NW 164.3-164.5' - Fracture, vertical, stepped, carbonate fines matrix of fines are casing at 160.5 very pale orange (10YR 8/2), trace light brown (5Y 5/6) and black R26: 5 minutes particles (sum of fines is up to 5%), 165.77' - Fracture, horizontal, rough, planar, this sand grades to siltier with depth Limestone 165.98' - Fracture, horizontal, rough, 159.9-160.1' - moderate olive brown, undulating, open (5Y 4/4), strong HCl reaction, 1/16" elongated voids on 30-35% of 166.8' - Fracture, <5 deg, rough, stepped, surface, 10° bedding plane disconformity at 160.1 166.95, 167.7' - Fracture (2), <5 deg, smooth, undulating, tight Limestone And Carbonate Silt (ML) 168.4, 169.51' - Fracture (2), 10 deg and 160.1-160.5' - pale greenish vellow. 10-20 deg, smooth, planar, tight (10YR 8/2), very stiff, very fine grained, strong HCl reaction, with 168.58' - Fracture, horizontal, rough, 5-10% coarse grained grayish yellow (5Y 8/4) limestone fragments undulating, open 1/16", silty clayey lining over R27: 8 minutes 80%-90% of surface 169.8' - Fracture, horizontal, rough, Limestone 160.5-162.2' - vellowish gray, fine 170.05' - Fracture, horizontal, rough, grained, strong HCI reaction, voids absent to 161.3', 1/16" voids from 161.3' to 161.8' on 5%-10% of undulating, open 170.7' - Fracture, horizontal, smooth, undulating, tight, <1/16" brown clay lining surface, fossils casts/molds 162.2-165.15' - dusky yellow, (5Y over surface 170.95' - Fracture, horizontal, smooth, planar. 6/4), fine to very fine grained, mild to open, <1/16" silty coating over 100% of moderate HCI reaction, weak (R2), becoming (R2) weak rock from 171.17' - Fracture, smooth, planar, open approximately 163.5' to 164.5', voids 171.5' - Fracture, 40 deg, rough, stepped, variable over interval from 15-20% to <1% in some intervals (especially R2 172.2' - Fracture, 60 deg, rough, undulating, rock), fractures in 163.7-164.2' R28: 7 minutes tight, length is from 172.0-172.9' interval, trace organic laminae at 163.2'



PROJECT NUMBER: BORING NUMBER: 338884.FL

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ORIENTATION: Vertical

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

				12111 : ONL 330 3/11 100073, Hidd Totally, 11Q 10013, 1111		,	ORIENTATION: Vertical
WATER	LEVELS : 1.0	ft bg	s on 4/	<u>/22/07 START : 4/21/2007 END : 5/</u>	<u>9/2007</u>	Z LOGGER: T. Stewart, R. McCon	
>00	(9			DISCONTINUITIES	ပ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
BH	KUN H, A ER,	(%)	FRACTURES PER FOOT		- 일	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
A F E	GTF GOV		FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	<u>8</u>	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
P.S.E.	CEN	Ø	RA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	≥	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ΔОШ	0 1 12	₩.			S		
			NR/	173.15' - Fracture, horizontal, smooth,	Н	No Recovery 165.15-165.5'	
			2	undulating, open 173.7' - Fracture, <5 deg, smooth, stepped,	Ш	<ul> <li>Limestone 165.5-166.1' - moderate olive brown,</li> </ul>	1
-				tight		(5Y 4/4), strong HCl reaction,	-
_			1 1	174.08, 174.2, 174.35, 164.55' - Fracture (4),	╀┼┤	- laminated, voids up to 3/8" to 3/4"	-
			-	horizontal, smooth, planar, tight (open at	Ш	covering 50-60% of surface, some	
	R29-NQ			174.35)	Ш	cavity infilling with gray limestone	1
-	5 ft	51	10	174.7' - Fracture, horizontal, smooth, planar,	╫	- (nodules/intraclasts), trace fossil	-
_	94%			open, <1/16" thick brown clay over 100% of surface	+	molds and casts	-
			>10	175.1' - Fracture, <5 deg, rough, stepped,	Ш	166.1-166.8' - yellowish gray to very light gray, (5Y 7/2 to N8), very fine	
			- 10	open	Ш	grained, strong HCl reaction, 1/16"	1
400			4.0	175.6' - Fracture, <5 deg, smooth, stepped,	HH	voids on 5-10% of surface, cavities	R29: 6 minutes
180 -137.5			>10	open, dark brown to black stain over —	口	— (>5) 3/8"x3/16", fossil casts/molds	_
-137.5	180.5		NR	95%-100% surface	╀┼	common	_
			[	176.1' - Fracture, horizontal, rough, stepped,	Н	166.8-170.5' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine	
1 7			1	open 177.1' - Fracture, horizontal, smooth, planar,	口	to very fine grained, moderate to	1
-				tight	╁┷╂	strong HCl reaction, becoming	-
-			3	177.6, 177.7, 177.82' - Fracture (3),	廾┤	stronger with depth (up to R2), voids	_
				horizontal and <10 deg, smooth, planar, tight		up to 1/16" on 15-25% of surface	
	R30-NQ			177.9' - Fracture, 0-40 deg, smooth, stepped,	Ш	with some zones of very fine grained	1
-	5 ft	46	2	open, dark brown/black stain over 40% 178.1-178.4' - Fracture zone, 0-60 deg,	+ + +	limestone with 0% voids, cavities rare, laminated from 167.6-167.8'	-
_	100%			rough, undulating, open		very weak rock [R1]), some	-
			4	178.55' - Fracture, <5 deg, smooth,	Щ	brownish gray to light gray mottling	_
			-	undulating, open	Ш	especially from 168.7-169.3'	
105				179.17' - Fracture, horizontal, rough,	Ш	170.5-175.1' - dusky yellow to	R30: 9 minutes
185 <u>-</u> -142.5			3	stepped, open 179.25-181.2' - Fracture zone, rough to	╂┼┨	yellowish gray, (5Y 6/4 to 5Y 7/2), moderate to strong HCl reaction,	-
- 112.0	185.5			smooth, planar to undulating, open to tight	ш	voids up to 1/16" over 10-15% of	-
			4	180.8' - Fracture, <5 deg, rough, stepped,	Н	surface, 3/8"x3/16" cavities, trace	
1 7			4	open	╁┼	fossil molds//casts, laminated at	1
-				181.8, 181.87' - Fracture (2), horizontal,	ш	- 171.0', fine grained with occasional	-
-			7	smooth, planar, open	+	_ thin beds of very fine grained	-
				182.0' - Fracture, 0-90 deg, smooth, undulating, tight	Н	limestone with few voids especially near base of interval	_
	R31-NQ			182.6' - Fracture, <5 deg, rough, undulating,	Ш	175.1-175.4' - dusky yellow, (5Y 6/4),	
1 7	5 ft 99%	62	0	open	H	strong HCl reaction, laminated with	1
-	9970			182.95' - Fracture, 40 deg, rough, undulating	ᡛ╣	<ul> <li>black organic laminae, minimum</li> </ul>	-
I -			1 1	to stepped, tight	Ш	voids and cavities covering 50-60%	1
				183.65, 184.4, 186.4' - Fracture (3), horizontal, rough, undulating, open	$\vdash\vdash\vdash$	of surface - No Recovery 175.4-175.5'	
190				183.8' - Fracture, 0-<5 deg, smooth, planar to	Ш	Limestone	R31: 8 minutes
-147.5	400 5		5	stepped, open	Ш	175.5-180.2' - variegated dusky	-
-	190.5		NR/	184.17' - Fracture, horizontal, smooth, planar,	+	<ul> <li>yellow to light olive brown, (5Y 6/4 to</li> </ul>	End drilling on 5/9/07
			4	tight	$\Box$	5Y 5/6), fine grained, moderate to	End drilling on 5/8/07
				184.93, 185.2' - Fracture, rough, undulating, tight	Ш	strong HCl reaction, very weak (R1), light gray mottling (N8), fine grained	Water level 3.5' below
1 7				185.25' - Fracture, 40-50 deg, rough,	$1 \dashv$	limestone especially from	ground surface on 5/9/07 - Begin drilling at 190.5' on
-			3	undulating, tight	口	176.8-177.8', voids (1/16") common	5/9/07
-	B00 1:0			185.95, 186.0 - Fracture, horizontal, smooth,	₽₽	in fine grained material up to 15-20%	SC-8 collected at 191.15-
	R32-NQ 5 ft	40	2	open	Ш	of surface, some cavities up to	192'
	90%	70		186-186.4' - Fracture, vertical, rough, undulating, tight		3/8"-3/4"x3/8" deep, voids 1-3% in very fine grained material, some	]
1 7				186.4' - Fracture, horizontal, rough,	╁┼	cavity infilling, laminated very weak	1
-			4	undulating, open	団	rock from 177.9-180.2' with black	-
I -				186.6, 186.7' - Fracture, <5 deg, rough,	$\Box$	_ carbonaceous material	Door Constructor
195			>10	undulating, open	Н	No Recovery 180.2-180.5'	R32: 6 minutes
-152.5	195.5		NR	186.95' - Fracture, <5 deg, rough, stepped,	Ш		-
	100.0			open	$\Box$		-
			1 1		1		



PROJECT NUMBER: BORING NUMBER: 338884.FL A-11 SHEET

#### ROCK CORE LOG

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PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88)  $DRILLING \underline{\ CONTRACTOR: Universal\ Engineering\ Sciences,\ Gainesville,\ FL;\ Driller:\ M.\ Boatright;\ Cathead\ Operator:\ G.\ Davis$ 

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION: Vertical WATER LEVELS: 1.0 ft bgs on 4/22/07 START: 4/21/2007 END: 5/9/2007 LOGGER: T. Stewart, R. McComb, A. Bonilla LITHOLOGY DISCONTINUITIES COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD <u>∪</u> MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS 187.05-187.2' - Fracture zone, horizontal, Limestone 2 rough to smooth, planar, open 180.5-180.9' - yellowish gray, (5Y 187.8, 188.0, 188.51' - Mechanical break 7/2), very fine grained, moderate HCI 188.51' - Fracture, <5 deg, rough, undulating reaction, weak to medium strong (R2 2 to stepped, open, black carbonaceous to R3), voids/cavities absent to <1%, Driller's Remark: 197' 50% fossils absent 180.9-181.6' - variegated light olive brown with thin very dark gray/black material over 40% in upper surface loss of circulation 189.55' - Fracture, <5 deg, rough, stepped, R33-NQ 54 3 open 5 ft 189.65, 190.65, 190.8, 190.97' - Fracture (4), carbonaceous/organic laminae, very 100% weak rock (R1), <1/16" voids over 10-15% of surface, cavities absent horizontal, smooth, planar, open >10 189.96' - Fracture, <5 deg, rough, undulating, 181.6-183.8' - dusky yellow to tiaht 190.05' - Fracture, horizontal, smooth, planar, yellowish gray, (5Y 6/4 to 5Y 7/2), R33: 6 minutes 200 open, black carbonaceous material on 30% moderate HCl reaction, voids 6 157.5 covering 50-60% up to cavity size of surface 200.5 190.15' - Fracture, <5 deg and 30 deg, rough, ranging from 3/4" to 1-3/16"x1/8" to undulating, open 3/4", fossil voids and casts common >10 191.15' - Fracture, horizontal, smooth, planar, with some clasts/nodules/cavity infilling
183.8-185.5' - yellowish gray, (5Y
7/2), fine grained, moderate to strong
HCl reaction, weak to medium strong tiaht 191.95, 192.65, 194.05' - Fracture (3), 30 deg >10 and 40 deg, rough, undulating, open 192.3, 192.4' - Fracture (2), <5 deg, rough, R34-NO (R2 to R3), variegated very light gray undulating, open >10 0 5 ft 193.4' - Fracture, 20 deg, rough, undulating, (N8), predominantly very fine grained 60% open with some fine grained thin beds and laminae, voids on 20-30% of surface, 193.55' - Fracture, 70-80 deg, rough, stepped, open voids on 1-2% of surface in very fine NR 194.55-194.85' - Fracture zone, gravel grained materials R34: 4 minutes 185.5-187.8' - yellowish gray with very light gray mottling, (5Y 7/2 with 205 194.85, 195.5' - Fracture (2), horizontal, 162.5 rough, undulating, open and tight 205.5 196.25' - Fracture, 50 deg, rough, undulating, N8), moderate to strong HCI reaction, fine to very fine grained open >10 nodules, voids and cavities up to 197.3' - Fracture, <5 deg, rough, stepped, 3/8"-3/4"x3/16"-3/8' over 50-60% of tiaht >10 surface, voids in very fine grained intervals on 3-5% of surface, fossil 197.43, 197.65' - Fracture (2), horizontal and <5 deg, smooth, undulating, tight Note: Not sure where voids/casts common, abundant missing intervals actually 197.8' - Fracture, horizontal, smooth, planar, R35-NO cavities 70-80% from 187.2-187.75 occur, assumed missing tiaht 0 5 ft 198.25' - Fracture, <5 deg, smooth, 187.8-188.93' - yellowish gray, (5Y interval from bottom of 30% 7/2), black and dark gray mottled, undulating to planar, open core run, however, texture NR 198.5-199.60' - Fracture zone, 0-90 deg, very fine grained, moderate to strong of limestone very variable rough, undulating to stepped, open HCl reaction, laminated (black indicating that missing 199.68' - Fracture, 40 deg, rough, undulating, carbonaceous /organic laminae), zones are interspersed voids over 5-10% of surface throughout interval 210 open -167.5 200.07' - Fracture, smooth, stepped to 188.93-190.45' - Same as R35: 4 minutes 210.5 185.50-187.8' except thinly bedded planar, tight 200.17-200.3' - Fracture zone, <5-90 deg, very fine to fine grained >10 No Recovery 190.45-190.5' rough, stepped, tight 202.5-203.5' - Fracture zone, 0-90 deg, rough Limestone to smooth, planar to undulating, tight to open 205.5-206.7' - Fracture zone, 0-<5 deg, rough 190.5-195.0' - yellowish gray, (5Y 3 7/2), very fine grained, mild to moderate HCl reaction, chalk-like to smooth, planar to undulating, tight to open R36-NQ 206.7-207.0' - Fractures, 60-80 deg, rough to grained, voids and cavities up to 9 5 ft smooth, planar to undulating, tight 210.52-210.8' - Fracture zone, various 3/4"x3/16" covering 5-15% of 10 64% surface, laminated in upper 0.5', fracture angles, rock fragments variegated browns and grays (few 210.8' - Fracture, 0-50 deg, rough, fossils voids/casts), becoming more undulating, open common with depth, becoming NR R36: 4 minutes 211.15-211.4' - Fracture zone, rough to coarse grained with depth 215 smooth, undulating to planar, gravel-sized No Recovery 195.0-195.5' -172.5 215.5 fragments, open



PROJECT NUMBER:

33884.FL

BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS : 1.0	ft bg	s on 4	22/07 START : 4/21/2007 END : 5/	9/200	7 LOGGER : T. Stewart, R. McCom	nb, A. Bonilla
>00	<u>.</u>			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			>10	211.65' - Fracture, horizontal, smooth, undulating, tight 211.8' - Fracture, horizontal, smooth, planar,		Limestone 195.5-197.5' - yellowish gray, (5Y 7/2), mild HCI reaction, void and	R. McComb is the logger.
-			>10	tight 212.3' - Fracture, horizontal, rough, undulating, open	H	cavities up to 3/4" to 1-1/16"x1-3/16" to 3/4" on 20-30% of surface, voids and cavities less common with depth,	-
-	R37-NQ 5 ft 52%	8	>10	212.5-212.7 and 212.85-212.95' - Fracture zone, <5 deg, rough, undulating, open 213.4' - Fracture, <5-70 deg, rough,	Ħ	fossiliferous (molds and casts), some thin carbonaceous laminae 197.5-200.5' - yellowish gray, (5Y	218' circulation 100% loss
- 220 -177.5	220.5		NR	undulating, open 213.55' - Fracture, <5-90 deg, rough, undulating, open, black staining on 85-90% of surface 215.5-215.75' - Fracture zone, various fracture orientations, gravel-sized fragments,		7/2), very fine grained, very weak to weak (R1 to R2), 1/16" variable voids on 0-10% of surface, cavities rare (3/16"x3/16"), trace fossil molds/casts, very carbonaceous at 199.75-199.8' with thin occasional black laminae below	R37: 4 minutes
-			3	open 215.75' - Fracture, 0-<5 deg, rough, stepped, open	Ħ	<ul> <li>200.5-200.67' - very similar to</li> <li>197.5-200.5', "chalky" with dark</li> </ul>	-
	R38-NQ 5 ft 15%	0	NR	216.15' - Fracture, 0-40 deg, rough, undulating, open 216.15-217.1' - Fracture zone, horizontal, rough to smooth, planar to undulating, open 217.1' - Fracture, <5 deg, rough, undulating, open 217.3' - Fracture, 30 deg, rough, undulating, tight 217.6-218.1' - Fracture zone, <5-70 deg, rough, undulating, open 220.6' - Fracture, <5-30 deg, rough, stepped,		brown carbonaceous layers  200.67-202.8' - yellowish gray, (5Y 7/2), mild HCl reaction, voids and cavities covering 80-90% surface up to several inches up to 3/4"-1-3/16", medium grained fossiliferous molds and casts conglomeratic from 201.7-202.0' 202.8-203.5' - yellowish gray, (5Y 7/2), very fine grained, mild HCl reaction, with laminae, 1/16" voids	R38: 4 minutes
-	225.5		>10	open 220.95, 221.2' - Fracture, <5 deg, rough, undulating, open 225.5-228.0' - Fracture zone, 0-90 deg, rough		over <1% of surface area  No Recovery 203.5-205.5'  Limestone 205.5 203.0' yeallowigh grove (EV	- 226' Regain approximately
-			>10	to smooth, undulating, open	H	205.5-207.0' - yellowish gray, (5Y - 7/2), very fine to fine grained, mild to moderate HCl reaction, voids variable from <1% to over 50%-60%	20% circulation –
-	R39-NQ 5 ft	0	0		Ħ	variable from <1% to over 50%-50%  of surface, very fine grained rock contains <1-5% voids  No Recovery 207.0-210.5'	_
- - 230 -187.5	230.5		NR	- - -		Limestone 210.5-211.4' - yellowish gray, (5Y 7/2), mild to no HCl reaction, voids up to 1/16" on 35-40% of surface, few 3/8"- 3/4"x3/8" cavities, trace fossils as voids/casts, very fine to	R39: 3 minutes -
-	250.5		>10	230.5-231.0' - Fracture zone, rock fragments	Ħ	<ul> <li>fine grained, becoming very fine grained at bottom 0.1', little to no</li> </ul>	=
- - - -	R40-NQ 5 ft 10%	0	NR			voids, no fossils, medium strong (R3) rock 211.4-212.0' - yellowish gray, (5Y 7/2), fine grained, no to mild HCI reaction, laminated with black carbonaceous/organic material, thin vertical fracture extends from 211.4-211.5'	- - - - -
235_ -192.5	235.5			_			R40: 3 minutes



PROJECT NUMBER:	BORING NUMBER:				
338884 FI	Δ_11	SHEET	12	ΩE	15

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

WATER	LEVELS: 1.0	ft bgs	on 4/	22/07 START : 4/21/2007 END : 5/9	9/200	7 LOGGER : T. Stewart, R. McCon	nb, A. Bonilla
≥∩≘	(9)			DISCONTINUITIES	စ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 240 -197.5	R41-NQ 5 ft 0% 240.5	0	NR			212.0-212.7' - yellowish gray, (5Y 7/2), fine grained, friable, becoming coarser grained with depth, voids/cavities up to 3/8"-3/4"x1-3/8"-3/4", voids over 30-40% of surface, very weak rock (R1)  Limestone 212.7-213.7' - very similar to 210.5-211.4', fine to very fine grained, fossil molds/casts common, becoming very fine grained at bottom 0.1' with little to no voids, no fossils, approaching medium strong (R3) No Recovery 213.7-215.5'	R41: 2 minutes
- - - - - 245 -202.5	R42-NQ 5 ft 0% 245.5	0	NR	- - - - -		Limestone 215.5-217.0' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, very fine grained (chalk-like), becoming laminated with depth (black to dark gray carbonaceous/organic laminae), voids and cavities were common from 216.6-217.0', voids over 0-1% above grading to 5-10% with depth, cavities few, 3/8"x3/16", with fossil molds/casts becoming more common with depth, microfractures (healed) abundant in upper 0.6' 217.0-218.1' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction,	- - - - - - R42: 2 minutes
    250 -207.5	R43-NQ 5 ft 0%	0	NR	- - - - -		voids and cavities common (up to several centimeters), fossiliferous (molds/casts) and worm burrows (unfilled-open), gastropods, forams No Recovery 218.1-220.5'  Limestone 220.5-221.25' - yellowish gray to very light gray, (5Y 7/2 to N8), moderate HCI reaction, 1/16" voids on 10-15% of surface, cavities (up to several centimeters), fossiliferous (casts/molds) becoming less common with depth, "chalk-like" texture No Recovery 221.25-225.5'	No special cores have been pulled since SC-8 because RQDs <0.8' (for a continuous length)
-   -   -	R44-NQ 5 ft 8%	0	>10 NR	250.5-250.9' - Fracture zone, gravel-sized rock fragments -		No Recovery 221.25-225.5  Limestone  225.5-228.0' - yellowish gray, (5Y  7/2), fine grained, mild HCl reaction, extremely weak (R0), becoming more friable with depth, rock strength decreases with depth, voids/cavities over 30-40% of surface, fossiliferous casts/molds, occasionally laminated No Recovery 228.0-230.5'	- - - - -
255_ -212.5	255.5					- - -	R44: 5 minutes
1					1		1



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#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88)  $DRILLING \underline{\ CONTRACTOR: Universal\ Engineering\ Sciences,\ Gainesville,\ FL;\ Driller:\ M.\ Boatright;\ Cathead\ Operator:\ G.\ Davis$ 

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION: Vertical WATER LEVELS: 1.0 ft bgs on 4/22/07 START: 4/21/2007 END: 5/9/2007 LOGGER: T. Stewart, R. McComb, A. Bonilla DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS 255.5-256.1' - Fracture zone, gravel-sized Limestone >10 rock fragments 230.5-231.0' - yellowish brown, (5YR 256.1' - Fracture, <5-50 deg, rough, stepped, 7/2), no to mild HCI reaction, gravel-sized fragments, cavities and open >10 voids on 30-40% of surface, voids up 256.3, 256.5' - Fracture (2), 0-60 deg, rough, stepped to undulating, open to 3/16"x3/8", fossil voids/casts 256.5-256.7' - Fracture, vertical, rough, common R45-NQ 0 stepped, open No Recovery 231.0-250.5' 5 ft 256.7' - Fracture (2), <5-60 deg, rough, 34% Limestone 250.5-250.9' - yellowish gray, (5Y stepped NR 7/2), mild HCl reaction, fossiliferous 256.7-257.2' - Fracture zone, open, sand to gravel-size rock fragments (casts/molds), voids (<1/16") covering 80-90% of surface R45: 6 minutes 260 No Recovery 250.9-255.5' -217.5 Limestone 260.5 255.5-256.1' - yellowish gray, (5Y 260.5-261.35' - Fracture zone, horizontal and 7/2), fine to very fine grained, >10 vertical, rough, undulating to stepped, open moderate to strong HCI reaction, voids on 20-30% of surface, rare 1 261.5' - Fracture, <5 deg, rough, stepped, voids in very fine grained limestone, some fossil molds and casts open 261.55' - Fracture, 20 deg, rough, stepped, 256.1-257.2' - yellowish gray, (5Y 7/2), moderate to mild HCl reaction, R46-NO 261.7' - Fracture, 20 deg, rough, undulating 0 5 ft 26% extremely weak (R0), friable to stepped becoming gravel to sand-sized NR limestone fragments with depth, voids over 40-50% of surface No Recovery 257.2-260.5' R46: 5 minutes 265 Limestone 260.5-261.8' - yellowish gray, (5Y -222.5 265.5 7/2), laminated from 260.5-261.0', 265.5-265.7' - Fracture zone, rock fragments 10 some bluish gray banding at 265.7' - Fracture, horizontal, rough, 261.5-261.6', very weak (R1) to extremely weak (R0), voids and undulating, open 265.8' - Fracture, <5 deg, rough, undulating, cavities rare in upper laminated tiaht section becoming common with depth, some fossil casts/molds R47-NQ No Recovery 261.8-265.5' 0 5 ft NR Limestone 8% 265.5-265.9' - yellowish gray, (5Y 7/2), fine to very fine grained, mild HCl reaction, very weak (R1), voids and few cavities, very fine grained R47: 3 minutes limestone containing few <5% voids, 270 -227.5 cavities 3/8"x3/16", trace fossil 270.5 voids/casts 270.5-271.25' - Fracture zone, variable No Recovery 265.9-270.5' >10 fracture orientation Limestone 271.25' - Fracture, 40 deg, smooth, planar, 270.5-271.9' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, gravel-sized limestone to open 4 271.75' - Fracture, horizontal, smooth, undulating to planar, open 271.25', voids and cavities becoming R48-NQ 272.0' - Fracture, 10 deg, smooth, planar, more common with depth, sparse 0 >10 5 ft tiaht through upper part of interval 70% 272.18' - Fracture, 40 deg, smooth, stepped, 10 loose, conical in shape 272.35' - Fracture, horizontal, smooth, R48: 6 minutes NR 272.5, 272.62, 272.73, 272.95, 273.03' -275 Fracture (5), horizontal, smooth, planar, open -232.5 275.5



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.7 N, 457813.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

				11211 . GIVIE 330 3/14 1000/3, Midd Totally, 14Q 10013, 1444		•	ORIENTATION: Vertical
WATER	LEVELS : 1.0	ft bg	s on 4		9/200	· ·	
>	(9)			DISCONTINUITIES	ŋ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
BH	CN 4, A ER)	(%	FRACTURES PER FOOT		음	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
HAY.	GTF	(%) Q	FOL	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BO	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
F R F	ENCE	Ø	RA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Σ	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
Δош	0 1 12	22	шп		S		
				273.18-273.6' - Fracture zone, variable	Ш	Limestone	
			>10	fracture orientations, limestone gravel 273.6' - Fracture, horizontal, smooth,	$\top$	- 271.9-274.0' - yellowish gray, (5Y 7/2), moderate to strong HCl	_
-			0	undulating, tight	-	reaction, becoming stronger at	-
_			٣	273.8' - Fracture, <5 deg, rough, stepped	╨	- 273.6-273.8' (R2) and returning to	_
				273.8-274.0' - Fracture zone, various fracture	Н	very weak rock below 273.8', very	
_	R49-NQ			angles, rock fragments		fine grained (chalky), voids covering	_
-	5 ft	0		275.5-275.95' - Fracture zone, variable	╨	<ul> <li>5-10% of surface, laminated in upper</li> </ul>	-
_	26%			fracture orientation, rock fragments	$\pm 1$	0.5-0.7', trace cavities (3/8"x3/8"),	_
			NR	275.95' - Fracture, <5 deg, rough, stepped,		trace fossil molds/casts, gravelly and blue with some black	
				open 276.3' - Fracture, <5 deg, rough, undulating,	Ш	carbonaceous/organic material	_
				open	+	No Recovery 274.0-275.5'	R49: 4 minutes
280_				276.3-276.8' - Fracture zone, smooth to —		Limestone	_
-237.5	280.5			rough, planar to undulating, variable fracture	ш	275.5-276.8' - yellowish gray to very	_
1 7				orientation, rock fragments	$\vdash$	light gray, (5Y 7/2 to N8), fine to very	I
-			>10	280.5' - Fracture, <5 deg, rough, stepped,	亡	fine grained, mild to strong HCI reaction, light gray thin bed at	-
-			<u> </u>	open 280.5-281.8' - Fracture zone, numerous	╨	276.55', voids and cavities common	-
			3	fractures, some vertical	ᅪ	up to 3/8"-3/4"x3/16"-3/8", voids and	_
			١	282.2' - Fracture, <5-40 deg, rough, stepped,		cavities on 40-50% of surface, rock	
_	R50-NQ			open	┰╙	(except for N8 limestone where voids	-
-	5 ft	0	>10	282.75-283.15' - Fracture zone, 10 deg,	╁┯	are absent), fossil casts/molds,	_
_	64%			rough, planar, tight		strong HCI reaction for very fine grained N8 rock	_
			_1_	282.75' - Fracture, <5 deg, rough, undulating,		No Recovery 276.8-280.5'	
				open	T	Limestone	_
			NR	283.15' - Fracture, <5-90 deg, rough, stepped, open		<ul> <li>280.5-282.75' - yellowish gray, (5Y</li> </ul>	R50: 3 minutes
285 <u>-</u> -242.5				283.33' - Fracture, 20 deg, rough, stepped, —	╨	7/2), fine grained, mild to moderate	——————————————————————————————————————
-242.5	285.5			tight	上	HCl reaction, voids and cavities	
	·					common over 60-70% rock with occasional intraclastic limestone rock	Total Depth is 285.5', no
_					1	fragments (darker gray) with cavity	special cores since SC-8,
-					-	infilling, cavities 3/8"-3/4" to 3/16"-	no lengths >0.8'
					┛	3/8", fossiliferous (molds and casts)	_
						282.75-283.7' - variegated pale blue	
					1	- to yellowish gray, (5PB 7/2 to 5Y	_
-					1	7/2), fine to medium grained, mild to moderate HCl reaction, becoming	-
-					4	- laminated with depth, fossil	-
						casts/molds common in upper 0.3'	
1 7						(gastropods), voids and cavities	1
-					1	present (up to several centimeters)	-
-				_	-	No Recovery 283.7-285.5'	
1 4					1	Bottom of Boring at 285.5 ft bgs on 5/9/2007	_
						5,5,2001	
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724065.3 N, 457848.9 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8 tri-cone bit

					·	END : 5/4/2007		-D .	١٨/	ONIENTATION : Vertical
WATER	LEVELS	: 5.3 ft bo	S UH U5/(		START : 5/2/2007	END: 5/4/2007 SOIL DESCRIPTION	LUGGE			Elliott, R. McComb  COMMENTS
≩Q≆ I	CAMPIE	INTERVA	I /ft\	STANDARD PENETRATION		JOIL DEJONIF HON		$\dashv$	ဗ ဂ	OOIVIIVILINTO
ELO ON (	SAIVIPLE			TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBOL	COLOR.		.IC	DEPTH OF CASING, DRILLING RATE,
H B		RECOVE			MOISTURE	E CONTENT, RELATIVE DE	NSITY OR		BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTEN	NCY, SOIL STRUCTURE, MI	NERALOGY		SYMBOLIC LOG	INSTRUMENTATION
42.1	0.0			(14)	Poorly Graded	d Sand (SP)		+	-	
-		1.0	SS-1	1-2-2	0.0-0.8' - light	gray, (N7), moist, very loos	se, very fine	+		<del>-</del>
-		1.0	33-1	(4)		I, trace nonplastic fines, bla ith plant roots at 0.2-0.3', s		Æ	П	Water level is based on Ground Water -
-	1.5				Silty Sand (SI		,	H		Monitoring at LNP site (FSAR Table 2.4.12.08)
-					0.8-1.0' - mode	erate brown, (5YR 4/4), mo	oist, very	4		15:45 on 5/2/07 preparing to drill
_					nonplastic fine	e to fine grained, approximes, gradational contact with	ately 20% overlving	4		-
_					material, sand		, 0	4		-
_								4		<u>-</u>
_								_		_
_										_
5	5.0						_			
37.1					Silty Sand (SI	<b>M)</b> wish gray, (5YR 7/2), wet, l	ooco vorv			Water table about 5' below ground surface
		1.3	SS-2	4-4-4 (8)	fine to fine gra	ained, grading more silty wi	th depth, /			
	6.5			(0)	_ \approximately	46% nonplastic fines, san	d is silica	7		_
					Lean Clay (CL	<b>-)</b> olive gray with dusky yellov	v mottlina	/1		_
-					\(5YR 5/2 with	5YR 6/4), medium stiff, me	dium	1		_
-					\plasticity, no d	lilatancy, with increasing pl .0', 10% very fine grained s	asticity and	1		_
_					less sand at o.	.o, 1070 very fine granica c	silica saria	1		<del>-</del>
-								1		-
-								1		-
10	10.0							1		-
32.1	10.0				Silt (ML)			$\pm$	П	<del></del>
-		1.1	SS-3	20-29-50		ayish orange, (10YR 7/4),		$\mathbf{H}$		-
-	44.5		000	(79)	☐ HCl reaction, 1	tic, rapid dilatancy, modera 10-15% very fine grained s	and, all	∕╬	Щ	-
-	11.5				carbonate		/	′ ┨		-
-								+		-
-								+		-
-								+		-
-								4		-
-								4		-
_								4		-
15	15.0	0.0	00.4	50/0 F		450450		4		
27.1	15.3	0.0	SS-4	50/3.5 (50/3.5") /	No Recovery	15.0-15.3		+		<u>-</u>
_				(00,010)						_
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PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724065.3 N, 457848.9 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8 tri-cone bit

WATER	LEVELS	: 5.3 ft bo	ıs on 05/0	03/07 S	TART : 5/2/2007 END : 5/4/2007 LOGGEF	R : V	V. Elliott, R. McComb
				STANDARD	SOIL DESCRIPTION	رس	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLICLOG	
CE.		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTF JRF4			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	AMB.	INSTRUMENTATION
월 22.1	00.0			(N)	Cilly Cond Wish Limostone (CM)	ίΩ	1.
	20.0			24-21-22	Silty Sand With Limestone (SM) 20.0-21.0' - grayish orange, (10YR 7/4), wet, dense,	$\  \ $	-
_		1.0	SS-5	(43)	fine to coarse grained, moderate HCI reaction, 24% nonplastic fines, 30% fine to coarse gravel sized (up		14 -
_	21.5				to 1"), fragments are very porous and fossiliferous, all	1	_
_					carbonate	l	_
_					-	1	_
_					-	1	_
_					-	1	_
_					-	1	_
_					-	1	_
25 <u> </u>	25.0				Cillar Count (CMA)	1	
17.1	0.5	0.7	SS-6	12-50/4.5 (62/10.5")	Silty Sand (SM) 25.0-25.7' - Same as 20.0-21.0' except 25-30%		-
_	25.9			(02/10.5)	nonplastic fines, 25% fine gravel sized	Γ	_
_					-	1	_
_					-	ł	_
_					-	ł	_
_					-		_
_					-		Driller's Remark: Soft at 28.5'
_					-	1	Driller's Remark: Soit at 28.5
_					-	1	_
30 <u> </u>	30.0				Cillar Cound Milita Current (CRA)	1	
12.1				20-11-15	Silty Sand With Gravel (SM) 30.0-31.0' - Same as 20.0-21.0' except dark yellowish -	-	_
_		1.0	SS-7	(26)	orange, medium dense	Ш	4 -
-	31.5				-	ł	-
_					-	ł	-
-					-	1	Driller's Remark: Harder at 32.5'
-					-	ł	- Dillier's Hemark. Harder at 32.3
-					-	ł	-
-					-	$\mathbf{I}$	-
-	25.0				-	$\mathbf{I}$	Driller's Remark: Switch to NQ at 35'
35 7.1	35.0 35.1	0.0	SS-8	50/1	No Recovery 35.0-35.1'	⊨	5.mo. o Homan. Owner to reg at 55
''' -				(50/1")	Begin Rock Coring at 35.0 ft bgs	1	-
-					See the next sheet for the rock core log	1	-
-					-	$\mathbf{I}$	-
-					-	$\mathbf{I}$	-
-					-	1	-
-					-	1	-
-					-	1	-
-					-	1	-
					-	1	-
40						╀	
						1	



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A-12

SHEET 3 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724065.3 N, 457848.9 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 5.3	ft bgs	on 0	5/03/07 START : 5/2/2007 END : 5/	4/2007	LOGGER : W. Elliott, R. McComl	)
<b>₹</b> □₽	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B FACE /ATIC	E RU STH, OVEI	(%) O	STUF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	S O	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	35.0					Limestone	HW casing set at 35'
-			2	35.4' - Fracture, <5 deg, rough, stepped,	Т	<ul> <li>35.0-39.9' - moderate yellowish brown, (10YR 5/4), fine grained, mild</li> </ul>	-
-				open 35.6' - Fracture, 0-40 deg, rough, stepped,	$\vdash$	HCl reaction, very weak (R1),	-
-			3	tight 36.05' - Fracture, 40-70 deg, rough, stepped,	H	<ul> <li>becoming extremely weak (R0) and friable at 38.9-39.3', fossiliferous</li> </ul>	-
_	R1-NQ			approximately 0.3-0.4' long, open to tight		(molds and casts) with voids - covering 50-60%, cavities >5 up to	-
	5 ft 98%	50	0	36.2' - Fracture, 40-70 deg, rough, stepped, approximately 0.3-0.4' long, open to tight		3/8"-3/4"x3/16", mottled, less voids	
			1	36.8' - Fracture, 30 deg, rough, undulating,		through extremely weak rock zone	
			•	tight 38.2' - Fracture, 70 deg, rough, undulating,			
_			3	tight 39.05, 39.25, 39.5' - Fractures (3), <5-90	$\perp$	_	R1: 6 minutes
40	40.0		NR.	deg, rough, stepped, tight to open	尸	No Recovery 39.9-40.0'	_
2.1			0		H	_ Limestone	_
-			_		Ш	40.0-43.2' - Same as 35.0-39.9' except with interbeds of very weak to	-
-			2		$\perp$	extremely weak (R1 to R0) rock at	_
_	D0 N0			41.65' - Fracture, 60 deg, rough, stepped, open	+	40.5-41.3' -	-
-	R2-NQ 5 ft	8	>10	41.9' - Fracture, 40-60 deg, rough, stepped,		_	-
-	64%		. •	open 42.3-42.9' - Fracture zone, <5-90 deg, rough,		_	-
-				stepped to undulating, open		_ No Recovery 43.2-45.0'	Driller's Remark: Very soft _ drilling at 43.5'
-			NR			-	R2: 3 minutes
45	45.0				Ш	=	-
45 <u> </u> -2.9	45.0			45.0-45.3' - Fracture zone, <5-90 deg, rough,	₩	Limestone	
-			>2	stepped, open 45.65' - Fracture, horizontal, rough,	田	<ul> <li>45.0-48.4' - moderate yellowish brown, (10YR 5/4), fine grained, mild</li> </ul>	-
-				undulating, tight	Ш	HCl reaction, very weak (R1),	-
_			1	46.3' - Fracture, horizontal, rough, undulating, open	ш	<ul> <li>fossiliferous (casts/molds), voids typically up to 1/16" over 40-50%,</li> </ul>	-
-	R3-NQ					cavities (>5) up to	-
_	5 ft 68%	47	3	47.7' - Fracture, 10 deg, rough, planar, tight		<ul> <li>1-3/16"-1-9/16"x3/8" (fossil casts), cavities more common from</li> </ul>	-
			3	47.8' - Fracture, 60 deg, rough, planar, tight	Н	45.0-46.0'	
				47.9' - Fracture, <5 deg, rough, undulating, open	$\square$	No Recovery 48.4-50.0'	
_			NR	48.0' - Fracture, 40 deg, rough, planar, open 48.2' - Fracture, <5 deg, rough, undulating,	口	_	R3: 3 minutes
50	50.0			open	Ħ	<u></u>	_
-7.9			10	48.25' - Fracture, 80-90 deg, rough, undulating, tight	H	Limestone - 50.0-54.2' - Same as 45.0-48.4'	_
_				50.4-51.1 - Fracture zone, 0-90 deg, rough,	出	except becoming mottled with	-
_			1	undulating to stepped, open to tight	₽	brownish gray patches of irregularly distributed finer grained limestone	-
-	DANO			51.9' - Fracture, 20-30 deg, rough,	円	- -	-
-	R4-NQ 5 ft	68	2	undulating, tight	口	-	-
-	84%			52.1' - Fracture, rough, undulating, tight 52.7' - Fracture, 30 deg, rough, stepped to	囯	_	SC-1 collected at 52.75-
-			1	undulating, tight, very soft on either side of fracture	団	-	53.75'
_				53.7' - Fracture, 40 deg, rough, stepped,	$\blacksquare$	_	R4: 4 minutes
-	55.0		NR	open	igoplus	No Recovery 54.2-55.0'	-
55	55.0				Ħ		
					Ш		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724065.3 N, 457848.9 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, HW casing

WATER LEVELS : 5.3 ft bgs on 05/03		on 0	5/03/07 START : 5/2/2007 END :	5/4/200	LOGGER: W. Elliott, R. McComb		
>∩≎	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	Š SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-12.9			10	55.0-55.6' - Fracture zone, 0-90 deg, rough, undulating to stepped, open to tight		Limestone - 55.0-59.8' - Same as 50.0-54.2'	
_			10	56.0-56.5' - Fracture zone, 0-90 deg, rough, undulating to stepped, open, very soft brown "clayey" infilling at 56.4-56.5'		except with very fine grained     yellowish gray limestone at 55.7-55.9'     (irregular), generally weak (R2) and     free of voids and cavities compared	
-	R5-NQ 5 ft 96%	64	2	57.45' - Fracture, 50 deg, rough, stepped, tight, black organics over 10-15% of surface		with adjacent rock, very weak (R1)  with thin friable zone of extremely weak rock (R0), adjacent to some fracture traces	
_			2	57.65' - Fracture, 10 deg, rough, stepped, open, black organics over 5% surface		-	R5: 6 minutes
60 <u> </u>	60.0		NR.	59.3' - Fracture, horizontal, rough, undulating, tight 59.8' - Fracture, 0-90 deg, rough, stepped, fine grained sandy carbonate covering 100%		No Recovery 59.8-60.0' Limestone	-
_			0	of surfaces		60.0-61.5' - Same as 55.0-59.8' -	
_	R6-NQ 5 ft	20	1 10	61.55' - Fracture, 0-50 deg, rough, stepped, open 62.0-62.9' - Fracture zone, 0-90 deg, rough,		61.5-62.3' - moderate yellowish brown, (10YR 5/4), mild to no HCl reaction, extremely weak to very	SC-2 collected at 63.1-
-	96%	20	0	stepped, open to tight, soft clay at 62.1' and 62.3' lining fracture trace		weak (R0 to R1), cavities <1-3%, fossils (casts/molds) absent, thinly laminated, mottled.	64.1'
-			0			62.3-64.0' - moderate yellowish brown, (10YR 5/4), fine to very fine grained, weak to medium strong (R2	R6: 7 minutes
65 <u> </u>	65.0		NR.		世	to R3), voids up to 1/16" over 5-10%, — few cavities up to 3/16"x3/16", trace fossil molds/casts.	-
_			1	65.75' - Fracture, smooth, planar, tight, horizontal		64.0-64.8' - Same as 62.3-64.0' - except very weak (R1), thinly laminated at 64.2' (possible	
_	R7-NQ		10	66.2-67.1' - Fracture zone, 80 deg, smooth, undulating, dominated by fracture trace inclined approximately 80 deg from	$\pm$	organics), trace fine grained stronger rock No Recovery 64.8-65.0'	
-	5 ft 100%	50	10	66.2-68.1, with horizontal fracture at 66.2' 67.3-68.1' - Fracture zone, 80-90 deg, rough, undulating, tight to open		Limestone 65.0-69.35' - moderate yellowish brown, (10YR 5/4), fine to very fine	
-			3	68.55' - Fracture, horizontal, rough, undulating, open 68.6' - Fracture, 50 deg, rough, stepped,		grained, moderate HCl reaction, very weak to weak (R1 to R2), voids (generally 1/16" or less) over	R7: 5 minutes
70 <u> </u>	70.0		3	open 69.35' - Fracture, 40 deg, rough, undulating, tight	井	10-30%, more dense at 65.0-66.0' and 68.5-69.35', cavities more abundant in same two intervals up to	-
_			2	69.65' - Fracture, horizontal, rough, stepped, open 69.8-70.0' - Fracture, 0-90 deg, rough,		3/4"-1-3/16"x3/8", some mottling, possible void with cavity infilling at 68.5-69.35', very weak (R1) zone at	
_	R8-NQ	70	1	stepped, open 70.2' - Fracture, 0-90 deg, smooth, stepped, open		approximately 66.0' 69.35-70.0' - moderate yellowish brown, (10YR 5/4), very fine grained,	
-	5 ft 98%	78	1	70.65' - Fracture, 70 deg, rough, undulating, tight 71.85' - Fracture, 10 deg, smooth, undulating,		moderate HCl reaction, weak (R2),     thinly laminated, with trace very fine     grain limestone rock nodules up to     1/8" voids become more common	Driller's Remark: 80% loss of circulation water at 75'
_			2	tight 72.15' - Fracture, 40 deg, rough, stepped, open	H	with depth from <1% up to 10-15%	R8: 13 minutes
75	75.0				$\blacksquare$		



FRACTURES PER FOOT

NR

NR

NA

2

1

3

3

2

1

NR

0

2

5 ft | 76 | 2 100% |

2

2

0

1

3

2

2

48

tiaht

open

(sandy)

100%

to 1/16" thick

undulating, tight, clayey

smooth, undulating

surface, open

undulating, open

undulating, tight

undulating, tight

RQD(%)

26 1

WATER LEVELS: 5.3 ft bgs on 05/03/07

CORE RUN, LENGTH, AND RECOVERY (%)

R9-NQ

5 ft 70%

R10-NO

5 ft 72%

R11-NO

R12-NQ

5 ft | 74

99%

DEPTH BELOW SURFACE AND ELEVATION (ft)

-32.9

80

-37 💆

85

42.9

85.0

90.0

-47.<del>9</del>

95

95.0

80.0

PROJECT NUMBER:

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SHEET 5 OF 10

#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724065.3 N, 457848.9 E (NAD83)

START: 5/2/2007

**DESCRIPTION** 

DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS

73.95' - Fracture, 0-90 deg, smooth, stepped,

74.1' - Fracture, <5 deg, rough, stepped,

open, clay (brown) over 90% of surface

78.45' - Fracture, 0-30 deg, rough,

open, dark gray staining over 30%

80.43' - Fracture, horizontal, rough,

81.05' - Fracture, horizontal, rough,

<1/16" thick over 100% of surface

black organic stains over 15-20%

undulating, open, dark gray staining over

undulating, open, gravel filled

open, gravel filled

74.7' - Fracture, horizontal, rough, stepped,

77.1' - Fracture, <5 deg, smooth, undulating,

78.7' - Fracture, horizontal, rough, undulating,

79.65' - Fracture, 20 deg, rough, undulating,

tight, black organic film over 100% of surface

80.1' - Fracture, horizontal, rough, undulating,

open, dark gray staining over 30% 80.2' - Fracture, horizontal, rough, undulating,

undulating to stepped, open, brown clay lining

81.35, 81.5' - Fractures (2), smooth, planar,

82.35' - Fracture, horizontal, rough, stepped,

open, brown clay lining (silty and sandy), up

82.65, 83.6' - Fractures (2), <5 deg, rough,

86.7, 86.8' - Fractures (2), <5 deg, rough,

87.9' - Fracture, <5 deg, smooth, undulating, film of black organic stains over 100% of

87.95' - Fracture, 60-70 deg, rough, stepped,

stepped, open 89.42, 89.7' - Fractures (2), horizontal, rough,

88.25, 88.4' - Fractures (2), <5 deg, rough,

92.4' - Fracture, 40 deg, rough, undulating,

92.95' - Fracture, <5 deg, rough, undulating,

93.5' - Fracture, 80 deg, smooth, stepped,

91.15' - Fracture, horizontal, smooth,

92.4-92.95' - Fracture, vertical, rough,

DISCONTINUITIES

72.2' - Fracture, 80-90 deg, rough, undulating, extends to 72.45', open

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

END: 5/4/2007

90

 $\underline{\circ}$ 

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

LOGGER: W. Elliott, R. McComb LITHOLOGY COMMENTS ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS 70.0-72.6' - moderate yellowish Driller's Remark: Soft brown, (10YR 5/4), very fine grained, drilling from 75-77 weak (R2) with some medium strong (R3) zones, voids up to 1/16" over 15-20% of core surface, decreasing with depth, rock becoming thinly laminated and weaker with depth, SC-3 collected at 77.1punctuated with light gray/yellowish 78.4 gray very fine grained, irregular-shaped nodules/clasts, voids generally lacking in lighter Driller's Remark: Advanced gray, very fine grained nodules/clasts NW casing to 80', regained 72.6-74.9' - Same as 70.0-72.6' circulation except with thick (6"") beds of R9: 8 minutes yellowish gray, very fine grained Driller's Remark: Very hard limestone, weak to medium strong from 80' to approximately (R2 to R3), thinly laminated with organics, in matrix of void/cavity characterized limestone No Recovery 74.9-76.5' Driller's Remark: Hard Silt (ML) again at 84' 76.5-77.1' - moderate yellowish brown, (10YR 5/4), wet, soft, rapid dilatancy, mild HCl reaction Limestone 77.1-78.4' - pale yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), very fine grained, strong R10: 10 minutes HCl reaction, medium strong to weak (R3 to R2), voids up to 1/16" over 10-15% decreasing with depth, cavities typically 3/8 to 3/4"x1/16" (fossil casts/molds), becoming lighter in color and containing less voids with denth 78.4-79.5' - fine to very fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids up to 1/16", cavities 1-3/16"-1-9/16"x3/8", clay laminae at 78.3-78.4' (brown, soft) 79.5-80.0' - very light gray to bluish white, (N8 to 5B 9/1), very light gray mottling, very fine grained, medium R11: 7 minutes strong (R3), voids (up to 1/16" or less) over 3-5%, several cavities up to 3/16"x3/16", several vertical to subhorizontal hairline fractures 80.0-81.5' - Same as 79.5-80.0' except becoming darker (brownish) with depth, cavities common at 80.4' 81.5-83.6' - moderate yellowish brown, (10YR 5/4), fine to very fine grained, moderate HCI reaction, very weak (R1), voids up to 1/16" over 30-40% surface, cavities up to 1-3/16"-1-9/16"x2", fossiliferous (molds/casts), extremely weak (R0) rock from 82.35-82.65' R12: 10 minutes No Recovery 83.6-85.0'



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724065.3 N, 457848.9 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, HW casing

			<u> </u>	12141 : OIVIE 330 3/14 1000/3, Midd Totally, 14Q 10013, 1144	000	9	ONENTATION: Vertical
WATER	LEVELS: 5.3	ft bg	s on 0	5/03/07 START: 5/2/2007 END: 5/	4/200	7 LOGGER: W. Elliott, R. McComb	
				DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		Ø	DESCRIPTION	SYMBOLIC LOG	DOOK TVDT OOL OO	
O A E	~ ~ ~	_	낊	DESCRIPTION	<u></u> 0	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
HAE H	동돈씨	(%) □	[⊉8	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ы	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
두뚜짓	888	οD	R <sub>F</sub>	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
BSH	8==	A O	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥ	CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
-52.9			NR/	93.65' - Fracture, <5 deg, smooth, undulating	1	Limestone	
_			1	to stepped, tight	┲	- 85.0-88.35' - Same as 81.5-83.6'	-
				94.05' - Fracture, horizontal, smooth,	╨	except black organic laminae at 88.0'	
				undulating, tight, black organic coating	т	and traces of black organic laminae	SC-4 collected at 98.15-
-			2	94.55' - Fracture, 80 deg, smooth, undulating,	╁	- from 87.0-88.0'	99.05'
-				tight	$\perp$	88.35-89.45' - variegated very pale	-
	R13-NQ		_	95.7' - Fracture, horizontal, smooth, planar,	Н	orange and very pale blue, (10YR 8/2 and 5B 8/2), strong HCl reaction,	
_	5 ft 98%	72	0	open 96.2' - Fracture, vertical, smooth, undulating,	┰┷	very weak (R1), possibly cavity fill	_
-	90%			tight		with brownish limestone; fossil	-
_			1	96.75' - Fracture, <5 deg, rough, stepped,	$oldsymbol{\perp}$	- casts/molds, voids over 15-20%, few	_
			'	open	$\vdash$	cavities 3/8"x3/16", three 2"x3/16"	
l -				98.15' - Fracture, 60 deg, rough, undulating,	+	black coated cavities (possible worm	R13: 6 minutes
l -			1	tight	二	– burrows)	-
100_	100.0		ND	99.05' - Fracture, 60 deg, rough, undulating,	Щ	89.45-90.0' - Same as 85.0-88.35'	
-57.9			NR.	tight —	$\vdash$	except fossiliferous, molds/casts and	
l -			>10	100.0-102.0' - Fracture zone, undulating,	╁	original material	-
I -				stepped, horizontal to inclined, open to tight	ш	90.0-91.15' - moderate yellow brown, (10YR 5/4), fine to very fine grained,	_
					Н	strong HCl reaction, very weak (R1),	
_			>10		╁	voids up to 1/16" over 40-50%,	-
-	R14-NQ				+T	cavities generally 3/16"x1/16", fossil	-
1 _	5 ft	54	1		$\perp$	_ casts/molds with whitish fossil layer	_
	100%	٠.	·	400 01 5 1 15 1 1 1 1 1	Ш	at 90.8', thin discontinuous black	
l –				102.8' - Fracture, <5 deg, rough, undulating,	1	organic laminae	-
-			0	tight, clayey	L	_ 91.15-94.95' - yellowish gray, (5Y	_
l _					Щ	7/2), very fine grained, moderate to	_
			١.		Н	strong HCl reaction, very weak (R1), voids 1/16" or less over 1-5% (up to	R14: 5 minutes
-			1			10-15% at 92.0-92.5'), thinly	End at 13:05 on 5/3/07
105 <u> </u>	105.0			104.9' - Fracture, <5 deg, rough, undulating,	╨	laminated at 93.8'	depth to water 5'3"
-02.9			2	tight, clayey	ᅪ	No Recovery 94.95-95.0'	Start on 5/4/07 depth to
			-			Limestone	water 5'3"
-				105.9' - Fracture, 70 deg, rough, planar, open	┰	95.0-95.7' - Same as 91.15-94.95'	_
l -			10	105.9-107.9' - Fracture zone, 0-90 deg,	+	95.7-95.9' - organic zone, thinly	_
				rough, undulating to stepped, open,	$\vdash$	laminated, black peat, soft, platy - 95.9-99.9' - yellowish gray, (5Y 7/2),	
I -	R15-NQ			dominated by vertical fracture that		fine grained, strong HCl reaction,	
-	5 ft	40	>10	propagates to 108.9' 105.95' - Fracture, 0-90 deg, rough,	┰	very weak (R1), voids over 40-50%,	_
-	100%		<u> </u>	undulating, open	╨	- cavities up to 3/4"-1-3/16"x3/8"-3/4"	-
			_	108.15' - Fracture, horizontal, rough,	$\vdash$	with thin (1/16"x3/8") black worm	
I -			2	stepped, open		tubes, some cavity fill at 97.8-98.0',	_
-			$\vdash$	108.4' - Fracture, horizontal, rough,	╁	<ul> <li>fossiliferous (casts/molds)</li> </ul>	R15: 7 minutes
I -			>10	undulating, open	$\vdash$	No Recovery 99.9-100.0'	-
110	110.0			109.25' - Fracture, 0-90 deg, rough, stepped,		Limestone — 100.0-105.0' - Same as 95.9-99.9'	
-67.9				tight —	工	105.0-110.0' - Same as 95.9-99.9' 105.0-110.0' - yellowish gray, (5Y	
-				109.35-110.0' - Fracture zone, 0-90 deg, rough, stepped, undulating, varying	╁	7/2), fine to very fine grained, strong	-
l -				orientations from vertical to horizontal	╨	HCl reaction, very weak (R1), voids	_
			NR	S. S. Madono Hom Vordout to Homzoniai		covering 10-15% in upper half of	
l -			''''		1	core, becoming less common with	-
Ι -	5.2				₩	<ul> <li>depth; cavities more common in</li> </ul>	-
	R16-NQ	45			┢	upper half also, typically 3/8"x3/16"	
I -	5 ft 45%	40	<u> </u>	440.75.445.01. 5		becoming absent with depth, some	Daille de Deservi. U
l -	75/0			112.75-115.0' - Fracture, horizontal, there are	╨	<ul> <li>molds/casts in upper half, absent below.</li> </ul>	Driller's Remark: Upper
l -			0	vertical fracture planes when rock has separated in thin (1/16") slices	$\vdash$	No Recovery 110.0-112.75'	2.75' was lost (soft-no recovery)
					Ė	1.5 7.000 voly 110.0-112.70	1000v01y)
I -					Ш		R16: 7 minutes
-			0		+	-	-
115	115.0				$\vdash$		
1					1		



PROJECT NUMBER:

33884.FL BORING NUMBER:

A-12 SHEET 7 OF 10

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724065.3 N, 457848.9 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

-				ENT : ONE 330 3/N 100073, Hidd Totally, NQ 1003, HW			ORIENTATION: Vertical
WATER	LEVELS: 5.3	ft bg	s on 0		4/2007	·	
> ^ ~				DISCONTINUITIES	ტ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표원인	ER'A	(%	FRACTURES PER FOOT		음	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
I ∓≅ ₹	A TES	(%) Q	FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOI	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
P. R. F.	RNI	Ø	RA(	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	≥	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	075	ď	ΗΔ		S		
-72.9			۾ ا	115.0' - Fracture, 0-40 deg, rough, stepped,	Ш	Limestone	
_			3	tight	Ш	<ul> <li>112.75-115.0' - yellowish gray, (5Y</li> <li>7/2), very fine grained, strong HCl</li> </ul>	1
-				tight		reaction, very weak (R1), voids <1%,	-
_			2	115.7' - Fracture, horizontal, rough, planar to	₽	- 4-5 cavities at approximately 114.2'	-
				stepped, open	Ш	generally 3/8"x3/8", fossils absent	
	R17-NG			116.02' - Fracture, horizontal, smooth, planar,	Ш	115.0-119.35' - Same as	
-	5 ft	60	>10	tight -	ш	- 112.75-115.0' except fossiliferous	-
-	100%			116.65' - Fracture, 0-70 deg, rough, stepped, tight	$+ \Box +$	zone at 118.5', casts/molds possibly original material	F
_			0	117.0-117.45' - Fracture zone, 0-90 deg,		- Onginal material	Fossiliferous zone at 118.7'
1				rough, stepped to undulating, tight to open	Ш		
1 -				117.72' - Fracture, horizontal, smooth, planar,	╁	_	R17: 9 minutes
1 -			>10	tight -	口	- 119.35-120.0' - Same as	-
120	120.0			119.3-120.0' - Fracture zone, various	₽₩	115.0-119.35' except except coarser	
-77.9				orientations, up to gravel sized limestone fragments	Ш	grained (gravelly to sandy), voids and	
1 -	1		1	120.15' - Fracture, 10 deg, rough, undulating,	口	- cavities more common than 115.0-119.35'	<u> </u>
1 -				open -	₩	115.0-119.35 120.0-121.3' - yellowish gray, (5Y	-
I -			0	-	П	- 7/2), fine grained, strong HCl	_
			ľ			reaction, very weak (R1), voids up to	
-	R18-NG			_	Ш	1/16" covering approximately	_
-	5 ft	95	0	<del>-</del>	$\Box$	- 15-20%, few cavities 3/8"x3/8", some	<del>-</del>
_	97%			<u>-</u>		mottling and some nodules of very fine grained limestone with no	_
<u> </u>			0		Щ	- voids/cavities	_
			١			121.3-122.7' - Same as 120.0-121.3'	SC-5 collected at 123.27-
-	1			-	Ш	except voids and cavities more	124.3'
-			0	-	╁┼	common, covering 60-70% of	R18: 6 minutes
125_ -82.9	125.0		NR.	_	$\Box$	surface, fossils (casts/molds) common	
-02.9			1		Н	_ 122.7-124.85' - Same as	_
			'	125.45' - Fracture, horizontal, smooth, planar,		120.0-121.3'	
-				tight -	ш	No Recovery 124.85-125.0'	-
_	-		0	-	+	Limestone	_
_				_	Н	125.0-128.5' - Same as	_
1	R19-NG				Ш	122.7-124.85' except fine to very fine grained, voids over 1-3%, cavities	
1 -	5 ft 100%	70	0	-	$\vdash\vdash$	rare, some cavity infilling/nodules,	_
1 -	100 /0			- 128.0-129.0' - Fracture zone, <5-90 deg,	世	sharp undulatory contact between	-
1 -			>10	rough, undulating to stepped, open to tight	Щ	_ different color limestone at 125.5'	-
1 _					Н	(possible stylolite)	_
1				129.0' - Fracture, 60 deg, rough, undulating,	口	128.5-129.0' - Same as 125.0-128.5' except some thin laminae, voids	R19: 7 minutes
400	120.0		10	open, gravel-filled -	ш	becoming more common, transitional	· -
130 <u> </u>	130.0			129.5-129.9' - Fracture zone, 60-90 deg, multiple fractures	╁┼	— with 129.0-130.0'	
1 57.5			1	130.1' - Fracture, horizontal, smooth, planar,	口	_ 129.0-130.0' - yellowish gray, (5Y	-
1			_ '	open	Ш	7/2), fine grained, strong HCl	
1 -				_	Ш	<ul> <li>reaction, very weak (R1), somewhat friable, cavities cover 70-80%, fossil</li> </ul>	<u> </u>
1 -			0	-	口	molds/casts, cavity infillings/nodules	<u>-</u>
1 -	D00 110			-	₽₽	- 130.0-130.6' - yellowish gray, (5Y	-
1 -	R20-NG 5 ft	88	0	_	Ш	7/2), fine to very fine grained, strong	_
1	96%	- 00			$\square$	HCl reaction, very weak (R1), voids	
1 -				- 133.15, 133.85' - Fractures (2), horizontal,	₽₽	<ul> <li>over 1-3% of surface, cavities</li> <li>1/16"x1/16", thinly laminated, fossils</li> </ul>	_
1 -			2	smooth, planar, tight	団	(molds/casts) rare and interlaminated	-
1 -				-	뭐	between very fine grained limestone	-
1			3		Н	_	R20: 7 minutes
135	135.0			_	Ш		]
100	100.0				1 1		
			1 1		1 1		



PROJECT NUMBER: BORING NUMBER: 338884.FL A-12 SHEET 8 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724065.3 N, 457848.9 E (NAD83)

DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis ELEVATION: 42.1 ft (NAVD88)

CORING	METHOD A	ND E	QUIPN	IENT : CME 550 S/N 186073, mud rotary, NQ tools, HW	casing	]	ORIENTATION : Vertical
WATER	LEVELS : 5.3	ft bg	s on 0	5/03/07 START : 5/2/2007 END : 5/	4/2007	LOGGER: W. Elliott, R. McComb	
≥0₽	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-92.9			(NR)	134.47, 134.62' - Fractures (2), horizontal,	П	130.6-132.65' - yellowish gray, (5Y	
-	<b>D</b> 04 NO		2	smooth, planar, open 134.72' - Fracture, horizontal, rough to smooth, stepped, open 135.25' - Fracture, 10 deg, smooth, planar, tight		<ul> <li>7/2), fine grained, strong HCI</li> <li>reaction, very weak (R1), voids and cavities common covering 50-60% of surface, some fossil molds/casts, some cavity infilling/nodules, some very fine grained thin laminae</li> </ul>	- - -
-	R21-NG 5 ft 98%	86	0	136.5' - Fracture, <5 deg, rough, stepped, open 136.8' - Fracture, <5 deg, rough, undulating, open		- 132.65-134.8' - Same as 130.0-130.6' except thinly laminated, very weak (R1), vellowish brown and	- -
-			0	139.2' - Fracture, <5 deg, rough, undulating,		light olive gray mottling associated with laminae, becoming darker with depth, some cavities and voids up to	R21: 8 minutes
140	140.0		2	open		<ul> <li>approximately 5-10% coverage</li> <li>No Recovery 134.8-135.0'</li> </ul>	-
-97. <del>9</del> -			NR) 0	139.3' - Fracture, <5 deg, rough, undulating, — open, gravel between fracture planes		Limestone 135.0-135.25' - light olive gray, (5Y 7/2), very fine grained, strong HCl	Driller's Remark: 80% loss of circulation at 140'
-			1	141.7' - Fracture, <5 deg, rough, undulating,		reaction, very weak to weak (R1 to R2), thinly laminated, voids <1% (1/16" or less), 1 cavity 1-9/16"x9/32"	-
-	R22-NG 5 ft 87%	76	5	open, dark brown organic stains 142.03' - Fracture, horizontal, rough, undulating, open with black organic coating		<ul> <li>(approximately 3/8" deep)</li> <li>135.25-137.7' - yellowish gray grading to moderate yellowish brown,</li> <li>(5Y 7/2 to 10YR 5/4), fine grained,</li> </ul>	SC-6 collected at 142.88- 144.13' -
-			0	over 100% 142.15' - Fracture, horizontal, rough, undulating, open, dark brown coating over	H	very weak (R1), thinly laminated from 135.25-135.5' and from 137.3-137.7' (sharp contact with underlying rock),	- -
145_ -102.9	145.0		NR	100% 142.4' - Fracture, horizontal, rough, undulating, open with black organic coating over 100%		voids up to 1/16" over 15-20%, few cavities generally 3/16"x3/16", trace fossil molds/casts	R22: 10 minutes -
-102.9			3	142.5' - Fracture, <5 deg, rough to smooth, undulating, open, no coatings 142.85' - Fracture, 10 deg, smooth,		137.7-139.2' - Same as 135.25-137.7' except yellowish gray, (5Y 7/2), voids <3-5%, few cavities	- -
-	R23-NC		1	undulating, tight  144.12' - Fracture, horizontal, rough, stepped, tight	H	generally 3/8"x3/16", fossil hash accumulation at 139.0-139.2', some — mottling, possible cavity	- -
-	5 ft 100%	97	0	145.1' - Fracture, horizontal, rough, undulating, open 145.8' - Fracture, 50-60 deg, rough, planar,		infilling/nodules 139.2-139.9' - yellowish gray, (5Y - 7/2), very fine grained, very weak	-
-			1	open 145.9' - Fracture, 50-60 deg, rough, planar, open	H	(R1), cleaves very easily due to large cavities (worm burrows), voids over 1-3% (<1/16") cavities up to 2"-2-3/8"x3/8"-3/4" (extending	R23: 6 minutes
150_ -107.9	150.0		0	146.4' - Fracture, horizontal, rough, undulating, open 148.7' - Fracture, <5 deg, rough to smooth,		completely through core), fossil molds/casts (gastropods) No Recovery 139.9-140.0*	- 
-			0	undulating 150.55' - Fracture, horizontal, smooth, planar, tight	Ħ	Limestone 140.0-142.5' - Same as 139.2-139.9' except becoming grayish yellow at	-
-	R24-NG		3	150.58' - Fracture, horizontal, smooth, planar, tight 150.83' - Fracture, horizontal, rough, stepped, open		140.0' and grading to yellowish gray/light olive gray (5Y 7/2 to 5Y 5/2) with depth, sharp boundary	-
-	5 ft 95%	70	0	stopped, open		<ul> <li>between grayish-yellow and yellowish</li> <li>grey at 140.6', cavities becoming</li> <li>more frequent/dense with small voids</li> </ul>	-
-			1			<ul> <li>(1/16") covering 10-15% of</li> <li>limestone, perhaps becoming somewhat coarser grained in depth</li> </ul>	R24: 6 minutes
155	155.0				H	-	



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	338884.FL	A-12	SHEET	9	OF	10	

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724065.3 N, 457848.9 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 5.3	ft bgs	s on 0	5/03/07 START : 5/2/2007	END : 5/4	/2007	LOGGER : W. Elliott, R. McCom	b
≥□₽	(%			DISCONTINUITIES		9	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUG PLANARITY, INFILLING MATERIAL THICKNESS, SURFACE STAINING, AND	L AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-112.9 - - - - - - -	R25-NQ 5 ft 100%	76	1 1 4 1	154.67' - Fracture, <5 deg, rough, u open 155.25' - Fracture, horizontal, rough smooth, undulating, open 155.85' - Fracture, horizontal, rough tight 156.7' - Fracture, horizontal, rough, tight 157.65' - Fracture, <5 deg, rough, u open 158.45-158.65' - Fracture zone, 70 crough, undulating to stepped, open 159.87' - Fracture, horizontal, rough undulating, tight	n to n, planar, planar, ndulating, deg, to tight		142.5-144.35' - yellowish gray mottled with dusky yellow, (5Y 7/2 and 5Y 6/4), fine to very fine grained, distinct boundaries between fine and very fine grained, voids more common in fine grained material covering 20-30%, 1-3% voids in very fine grained material occuring in irregular-shaped nodules, thinly laminated near top of interval, trace fossil molds/casts  No Recovery 144.35-145.0' Limestone 145.0-148.7' - yellowish gray to dusky yellow and light olive brown, (5Y 7/2 to 5Y 6/4 and 5Y 5/2), fine grained, strong HCI reaction, weak (R2), voids (<1/16") over 95-100% surface, becoming fossiliferous with depth, casts/molds with some cavities near base of interval 148.7-149.7' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 5/6), moderate to mild HCI reaction, very weak (R1), thinly laminated at 148.9' and with very fine grained beds at 149.0' (yellowish gray) 149.7-150.0' - Same as 148.7-149.7' except very fine grained, few voids 150.0-151.0' - yellowish gray mottled with dusky yellow, (5Y 7/2 and 5Y 6/4), very fine grained, strong HCI reaction, weak (R2), voids <1/16" over 1-3%, few cavities 3/4"-1-3/16"x3/8" 151.0-151.85' - Same as 150.0-151.0' except becoming thinly laminated with light olive brown, yellowish gray and light gray, (5Y 5/6, 5Y 5/2 and N5), fine to very fine grained, very weak (R1), thinly laminated with light olive brown, yellowish gray and light gray, (5Y 5/6, 5Y 5/2 and N5), fine to very fine grained, very weak (R1), thinly laminated, voids and cavities covering 40-50% surface (more so in fine grained, darker colored material), some fossil hash 152.5-154.75' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCI reaction, very weak (R1), coarse grained at 154.5-154.75', voids covering 40-50% surface (more so in fine grained, darker colored material), some fossil hash 152.5-154.75' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCI reaction, very weak (R1), coarse grained at 154.5-154.75', voids covering 40-50% surface tossil hash below 153.8' with fossils (mo	SC-7 collected at 156.68- 157.65'  R25: 6 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-12	SHEET	10	OF	10	

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724065.3 N, 457848.9 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

WATER	WATER LEVELS : 5.3 ft bgs on 05/03		on 0	03/07 START : 5/2/2007 END : 5/4/200		7 LOGGER: W. Elliott, R. McComl	0		
>00	(6		_	DISCONTINUITIES		<sub>O</sub>	LITHOLOGY	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHN PLANARITY, INFILLING MATERIAL AN THICKNESS, SURFACE STAINING, AND TIG	ND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.	
							Limestone  155.0-155.25' - light olive gray mottled with yellowish gray, (5Y 5/2 and 5Y 7/2), strong HCI reaction, very weak (R1), thinly laminated with organic material, voids over 20-30%, soft and friable from 155.0-155.1'  155.25-155.9' - light olive brown, (5Y 5/6), very fine to fine grained, strong HCI reaction, very weak (R1), voids (<1/16") covering 60-70% surface, trace fossil molds/casts  155.9-156.65' - yellowish gray, (5Y 7/2), fine to very fine grained, moderate to strong HCI reaction, very light gray (N8) interbeds, thinly laminated, especially from 156.5-156.65', voids (<1/16") covering 50-60%, voids <10% in gray very fine grained limestone  156.65-160.0' - yellowish gray, (5Y 7/2), fine grained, strong HCI reaction, very weak (R1), becoming more coarse grained and more fossiliferous (molds/casts) with depth, voids increase from 1-2% coverage to 60-70% with depth, possible void/cavity infilling from 158.0-160.0' (possible nodules/intraclasts)  Bottom of Boring at 160.0 ft bgs on 5/4/2007		



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	Δ-13	SHEET	1 OF 11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit

ORIENTATION: Vertical

						5/N 252457, mud rotary, auto na			
WATER	LEVELS	: 2.0 ft bo	s on 5/6/	07 5	START : 5/6/2007	END : 5/23/2007	LOGGEF	<u> </u>	Sump, P. De Sa'rego
> -				STANDARD		SOIL DESCRIPTION		ا ي	COMMENTS
ON E	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				07	
DEPTH BELOW SURFACE AND ELEVATION (ft)		RECOVE	RY (ft)			ME, USCS GROUP SYMBOL, CO E CONTENT, RELATIVE DENSI		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
H A A			#TYPE	6"-6"-6"		NCY, SOIL STRUCTURE, MINEF		MBC	INSTRUMENTATION
			# · · · · _	(N)				SΥ	
40.6	0.0					d Sand With Organics (SP)			Borehole located in staked wetlands area
_		1.1	SS-1	0-1-2	0-0.5' - moist,	very loose, very fine to fine gr lics and roots, sand is silica	rained, -	1	drill rig and equipment staged on swamp – mats, surface conditions are dry
-				(3)	→ Poorly Grade		Ē		mais, surface conditions are dry
-	1.5				\ 0.5-1.1' - light	gray, (N7), moist, very loose,		1	-
I -						d, trace nonplastic fines, organ th depth, sand is silica	nics / _	1	Weter table 0.01 below everyal confess
l _					uecreasing wi	in depin, sand is sinca		]	Water table 2.0' below ground surface
_							_		
-	1						-	1	1
-	1						-	1	1
							-	1	-
5 35.6	5.0				Silty Sand (SI	M)		7130	-
55.0 -				1-1-2	5.0-6.25' - gra	yish brown, (5YR 3/2), wet, ve	ery loose		-
I _		1.3	SS-2	(3)	very fine to fin	e grained, 20-25% nonplastic	fines,		_
	6.5			` ,	fines appear to	o be organic material, slight su to coarse sand-sized grains, i	ulfur odor,		
					cemented silic	ca sand concretions	/ -		
_	1							1	1
-							-	1	1
-							-	1	-
-							-	1	-
l -							-	1	_
I _							_	1	_
10	10.0								
30.6					Clayey Sand			9,1	SS-3A 10.0-10.2'
I -		1.1	SS-3	2-3-7		ark gray, (N3), wet, loose, fine ed, carbonate material, white l			SS-3B 10.2-11.1'
-				(10)	\fragments income	orporated (slough)		ه آ م`اه	-
-	11.5				Well Graded 9	Sand With Silt (SW-SM)		┨	Drilling's Remark: Approximately 10% loss of
-						ellowish gray, (5Y 8/1), wet, loc		-	circulation (limestone zones)
I _						d, strong HCl reaction, 10-15% es, material appears to be pred		1	·
l _					fossil fragmen		_		
									1
-	1						-	1	1
-	1						-	1	
45 -	45.0						-	1	-
15 <u></u> 25.6	15.0				Well Graded	Sand With Silt (SW-SM)		ا د اه	
			06 :	0-1-2	ີ 15.0-15.4' - Sa	ame as 10.2-11.1' except pale	yellowish /-		SS-4 15.4-16.0'
-		1.0	SS-4	(3)	_ ∖brown, (10YR	6/2), silty fines (slough)			=
	16.5			. ,	Silty Sand (SI	M)	2000 VOT		
					fine to fine are	ery light gray, (N8), wet, very loained, sand is predominantly s	ilica, 20%		1
1 -	1				fine to mediun	n grained carbonate sand, 20-	25%	1	1
-	1					es, scattered pockets of very p		1	
-	1					dium plasticity clay, moderate rbonate materials	noi   -	1	-
-	-							1	Driller' Remark: Drilling rate slowing down at
-							-	1	18.5'
-							-	1	_
20								$ldsymbol{ld}}}}}}$	
1	I				l			1	



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	A-13	SHEET	2 OF 11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical

			gs on 5/6/		START : 5/6/2007	5/N 252457, Mud 10ta END : 5/23/2				Sump, P. De Sa'rego
	LLVLLO	. 2.0 11 00	13 OH 3/0/		31ATT : 3/0/2007	SOIL DESCRIPTION		LOGGLIT		COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION					SYMBOLIC LOG	
BEL JON JON		RECOVE	RY (ft)	TEST RESULTS	SOIL NAM	ME, USCS GROUP SY	MBOL, COLOF	R,	CIC	DEPTH OF CASING, DRILLING RATE,
PTH EVAT			#TYPE	6"-6"-6"		E CONTENT, RELATI ICY, SOIL STRUCTU			MBC	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
SUI				(N)						
20.6	20.0	0.2	<u>SS-5</u>	50/2.5 (50/2.5")	Sandy Silt Wi	th Limestone (ML) ry pale orange, (10)	/R 8/2) maist		Ш	_
l _				(00/2.0)	nonplastic, vei	ry rapid dilatancy, m	oderate to stro	ong /		_
l _					HCl reaction, 3	35% fine to coarse s all carbonate materia	and-sized, 10°	% fine		_
l _					graver sizea, a	an carbonate materic	210			_
l _										_
l -								_		_
-								_		_
_								_		_
-								_		_
25	25.0								1.11.	
15.6	25.8	0.8	SS-6	39-50/3.5 (89/9.5")	Silty Sand (SI 25.0-25.8' - pa	<b>VI)</b> Ile yellowish orange.	, (10YR 8/2). n	noist -		Stop drilling for 5/6/07 due to thunderstorm/lightning hazard
-	25.8			(00/0.0)	to wet, very de	ense, fine to coarse ( reaction, 25-30% no	grained, mild to	io 🗂	Ш	-
-					fine gravel-siz	ed, all carbonate	oripiastic iiries	, trace		-
-										Decrees drilling 5/7/07 water level
-								-		Resume drilling 5/7/07, water level approximately 2.0' below ground surface -
_								=		-
_								-		Install surface assign (4") to approximately
-								-		Install surface casing (4") to approximately 28.5'
-								-		-
30 10.6	30.0 30.3	0.3	SS-7	50/3.5	Silty Sand (SI	M)			111	
10.0 -	00.0	0.5		(50/3.5")		ame as 25.0-25.8'		/-	1.1.1	-
-										-
-								-		-
_								-		-
_								-		-
-								-		-
-								-		-
-								-		-
-								-		-
35 5.6	35.0				Silty Sand (SI	VI)			111	
-		1.2	SS-8	37-47-19	35.0-36.2' - pa	ıle gravish orange gı	rading to pale	-		-
-	00.5	1.2	000	(66)	dense, fine to	n, (10YR 8/2 to 10Y coarse grained, mile	H 6/2), moist, d HCl reaction,	very _	Ш	Transitional to very weak limestone rock
-	36.5					astic fines, 10-15%				-
-					Carbonate			/ -		Much softer material, no loss of circulation
-								-		-
-								-		-
-								-		-
1 -								-		-
40								-		-
TU-									$\dashv$	



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.0 ft bo	gs on 5/6/	07 5	START : 5/6/2007 END : 5/23/2007 LOGGE	R : C	C. Sump, P. De Sa'rego
				STANDARD	SOIL DESCRIPTION	J (7	COMMENTS
LOW AND	SAMPLE INTERVAL (ft)  PENETRATION TEST RESULTS		PENETRATION TEST RESULTS				
ACE ATIOI		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTÁTION
0.6	40.0 40.7	0.7	SS-9	26-50/2 (76/8")	Silty Gravel With Sand (GM) 40 0-40 7' - light plive grav (5Y 5/2), moist to wet	•	_
_	40.7			(70/0)	40.0-40.7' - light olive gray, (5Y 5/2), moist to wet,  very dense, moderate HCI reaction, predominately	#"	<b>1</b> .
-					fine gravel to 1", 30-35% fine to coarse sand-sized, 20-25% low plastic fines, all carbonate, pyrite coating	-	-
-					on some large fragments	┨	-
-						┨	-
-	_					┨	-
-						1	-
-	-				-	1	-
45	45.0					L	_
-4.4	45.1	0.0	(SS-10)	50/1.25 (50/1.25")	No Recovery 45.0-45.1'  Begin Bock Coring at 45.0 ft bos		
_					Begin Rock Coring at 45.0 ft bgs See the next sheet for the rock core log	1	_
-						-	-
-	-					┨	-
-	_					┨	-
-						┨	-
-						1	-
-	-				•	1	-
50_					_		
-9.4							
-	-					-	-
-	<u> </u>				-	┨	-
-						┨	-
-					-	1	-
-	-					1	-
-						1	-
						]	
55					_	1	
-14.4						1	-
-	-				-	┨	-
-	_					┨	-
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-	-					1	-
-	1					1	-
-	]					1	
60_						┺	



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 2.0	ft bgs	on 5/	/6/07 START : 5/6/2007 END : 5/	<u>/23/2</u> 0	D7 LOGGER : C. Sump, P. De Sa're	go
≥∩ ::	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
FACE MATIC	E RU STH, OVE	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SURI ELE	COR	RQI	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-4.4	45.0				$\perp$	Limestone	Switch to rock coring
_			1	45.3' - Fracture or mechanical break, 50 deg, rough, undulating to mostly planar	世	<ul> <li>45.0-45.9' - pale yellowish brown, (10YR 6/2), moderate HCl reaction,</li> </ul>	(45.0')
-			_	45.9-47.9' - Fracture zone, friable,	Ъ	medium strong (R3), 10-20%	
			0	disaggregated material, numerous "breaks" handling material (unconsolidated)	Ή	<ul> <li>coverage of 1/6" to 1/8" small voids on surface, larger lenticular shaped</li> </ul>	_
	R1-NQ 5 ft	0	0		F	cavities (up to 1/2" long 1/6"-3/16" high), exhibit preferred horizontal	]
-	58%	U			F	orientation	_
_					Ħ	45.9-47.9' - Same as 45.0-45.9' - except very weak (R1) and	_
_			NR		片	disaggregáted, easily broken by hand into silty sand material	D4: 4 minutes
_					片	No Recovery 47.9-50.0'	R1: 4 minutes
50 -9.4	50.0			50.0-53.3' - unconsolidated silty, sandy,	+	Silty Sand With Limestone	
- 3.4				gravel material	-	− Fragments (SM)	-
-					4	50.0-53.3' - moderate yellowish brown, (10YR 5/4), moderate HCl	-
-			NA		-[[]	<ul><li>reaction, 20-25% fines, 35-40%</li></ul>	-
-	R2-NQ				-	sand, 35-40% gravel-sized fragments of friable limestone with fragments	-
-	5 ft 88%	13			-	– 1/4"- >1" size	-
-	0070					-	-
_			2	53.3-54.4' - Fracture zone, rough, irregular, non planar	世	<ul> <li>Limestone</li> <li>53.3-54.4' - pale yellowish brown,</li> </ul>	-
-			1	54.1' - Fracture, 10 deg, rough, planar, tight	╨	(10YR 6/2), moderate HCl reaction,	R2: 7 minutes
55	55.0		NR		F	<ul><li>medium strong (R3), 10-20% coverage of 1/16"-1/8" voids on</li></ul>	1
-14.4			1		brack	surface, few larger cavities/fossil molds (<1%) up to 3/4"	
			'	55.4' - Fracture or mechanical break, rough, undulating, nonplanar	፱	No Recovery 54.4-55.0'	
_			2	56.4, 56.8' - Fractures (2), 15 deg, rough,	耳	Limestone 55.0-56.8' - yellowish brown, (10YR	
_			_	planar	上	5/4), very fine grained, mild to moderate HCl reaction, weak (R2),	Horizontal partings -
_	R3-NQ 5 ft	47	3	57.0' - Bedding plane, 10 deg, rough, planar to stepped	上	20-25% coverage of 1/16"-1/8" small	associated with black laminations (soft) laminae
-	96%			57.7' - Mechanical break, rough, nonplanar	士	voids on surface, very fine dark black laminations (<1/16") 1/2"-1" spacing	are sinuous and exhibit -
-			3	57.95, 58.3' - Bedding plane (2), 5 deg, smooth, planar, (organic layer)	F	_ 56.8-59.8' - Same as 55.0-56.8'	more pinch and swell patterns and are often
-				58.6' - Bedding plane, 5 deg, smooth, 0.5" thick zone	Ħ	except weak (R2), finer grained (silt sized particles), reduced small void	slightly inclined to core –
-	00.0		2	58.8' - Bedding plane, smooth, planar	븎	density (<10%) and pronounced fine black laminations (lignite, organics)	diameter R3: 6 minutes
60 <u> </u>	60.0		NR.	59.1' - Fracture or mechanical break, horizontal, rough, undulating	片	— throughout interval and concentrated	-
-			2	59.4' - Fracture, 10 deg, rough, planar to undulating	廿	in zones up to 1/2" thick  No Recovery 59.8-60.0'	
-				60.5, 60.7, 61.4, 61.7' - Fractures or	世	Limestone 60.0-63.8' - Same as 56.8-59.8'	
_			3	mechanical break (4), horizontal, rough, undulating to planar	世	except weak to medium strong (R2 to	
_	R4-NQ	40	,	62.1, 62.3, 62.5' - Fractures (3), <10 deg,	干	<ul> <li>R3), decreasing density of fine black layering, variable density of small</li> </ul>	
	5 ft 76%	40	3	rough, undulating to semi planar	尸	voids (5-15% surface area), weak unconsolidated zone at 63.5' of silt	]
			2	62.4' Fracture rough undulating	丌	and sand with gravel	]
_				63.4' - Fracture, rough, undulating 63.5' - Fracture, 45 deg, rough, undulating	上	<ul><li>No Recovery 63.8-65.0'</li></ul>	
-			NR	- · · · · · · · · · · · · · · · · · · ·	Т	-	R4: 6 minutes
65	65.0			_	上		



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 2.0	ft bgs	s on 5/	6/07 START : 5/6/2007 END :	5/23/20	007 LOGGER : C. Sump, P. De Sa're	go
<b>₹</b> □₽	(%			DISCONTINUITIES	_ ၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING.
H BI	E RU STH, OVEF	(%) O	T. S.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30 [	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
EPT URF ILEV	SORE	ROL	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	s   ¤	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-24.4	Olk	IĽ.	ша		- M	Silty Sand (SM)	
-24.4			NA	65.4, 65.5, 65.6, 65.7' - Mechanical break (4),	4	65.0-65.8' - moderate yellowish	-
_				horizontal, rough, undulating to planar, fine	- 111	brown, (10YR 5/4), with gravel-sized limestone fragments 1/2"-2" size	-
_			4	sand/silt material on fracture surface	$\perp$	- \(disaggregated by drilling)	-
_					$\perp$	Limestone	_
_	R5-NQ 5 ft	10				- 65.8-66.8' - moderate yellowish - brown, (10YR 5/4), very fine grained,	_
_	36%				4	strong HCl reaction, weak to medium	_
_			NR		$\perp$	strong (R2 to R3), 15-20% coverage of 1/16" to 1/8" small voids on	_
_					口	surface, 1-2% coverage of larger	_
					廾	cavities/fossil molds up to 1/4" diameter, fine silt infilling in many	R5: 10 minutes
70	70.0					voids/molds	
-29.4			0		<b>_</b>	No Recovery 66.8-70.0' Limestone	
			U		$\perp$	70.0-74.9' - moderate yellowish	]
			_	71.1, 71.2' - Fracture or mechanical break	$\mathbf{H}$	brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, medium	SC-1 collected at 71.3-
			2	(2), horizontal, rough, undulating	I	strong (R3), fossiliferous, with 4"-6"	72.5'
	R6-NQ		4		Т	thick poorly fossiliferous, fine grained	<u> </u>
_	5 ft 98%	67	1	72.5-73.5' - Fracture or mechanical break,	1	intervals, low to medium density, up to 17-20% coverage of small	-
_				vertical, rough, undulating	1	(1/16"-1/8") voids and larger (up to	<u> </u>
_			2	73.4' - Fracture, 45 deg, rough, planar	1	3/4") cavities/fossil molds, lenticular inclusions of soft black organic	-
_				74.1' - Fracture or mechanical break,	1	material up to 1-1/2"x1/4" thick at	R6: 8 minutes
- 75	75.0		0	horizontal, rough, undulating	T	- 73.2-73.8', few fine (1/16"-3/16") organic inclusions	-
-34.4	70.0		NR)	75.2' - Fracture or mechanical break,	┰	No Recovery 74.9-75.0	_
_			1	horizontal, rough, undulating	$\pm$	Limestone 75.0-80.0' - Same as 70.0-74.9'	-
_				70 Ol. Fracture Edge rough planes	+	except mild HCl reaction, weak (R2),	-
_			5	76.2' - Fracture, 5 deg, rough, planar 76.3, 76.4' - Fractures (2), 30-45 deg, rough,	Ħ	5-15% coverage of small (1/16"-1/8") voids, loose sand-sized limestone	-
-	R7-NQ			undulating and planar	H	particles on fracture surfaces	-
_	5 ft	50	1	76.8, 76.95' - Fractures (2), horizontal, rough, undulating	╁	<del>-</del>	-
-	100%			77.7' - Fracture, 60 deg, rough, non planar	$\Box$	}	-
-			2	(radial) 78.0' - Fracture, 45 deg, rough, planar	$\pm$	<u>}</u>	-
-				78.3' - Mechanical break, horizontal, rough	+	<del> </del>	R7: 7 minutes
-	00.0		1	79.5' - Mechanical break, 0-15 deg, rough,	+	}	-
-39.4	80.0			undulating	╁	80.0-84.0' - Same as 75.0-80.0'	_
-			>10	80.4-80.7' - unconsolidated zone	+	except mild HCl reaction, weak to	-
-					$\perp$	medium strong (R2 to R3), with friable, extremely weak (R0), partially	-
-			1	81.4, 82.0' - Fractures (2), horizontal, rough,	+	unconsolidated zones at 80.4-80.7',	-
_	D0 NO			undulating and planar, (either end of	+	81.4-81.6', and 82.0-82.5'	-
_	R8-NQ 5 ft	23	>10	unconsolidated material) 82.0-84.0' - Fracture zone	$\Box$	+	-
-	80%			2 2 2 3 2 3 2 3 2 3 2 3 3 3 3 3 3 3 3 3	#	1	-
_			>10		₽	<u>}</u>	-
_					$\Box$		
_			NR		口	No Recovery 84.0-85.0'	R8: 6 minutes
85	85.0				ᆂ	1	
						1	



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

						INQ tools, FIVY casing	
WATER	LEVELS : 2.0	ft bgs	on 5		23/20		
>				DISCONTINUITIES	ပ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표원한	ER'A	(%	JRE		- C	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F A A	RE FIGER	D (%)	CTI	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	/BO	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
		a a	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SY <sub>N</sub>	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-44.4					+ "	Limestone	1/2" thick "greasy" organic
			1			- 85.0-89.9' - moderate yellowish	layer at 85.2
_				85.6' - Fracture, 45 deg, rough, planar	Ш	brown, (10YR 5/4), moderate HCI	
_				86.0-88.0' - Fracture zone, 0-30 deg,	$\vdash$	reaction, medium strong (R3),	1
-			>10	limestone fragments 1/4" to 2", larger	亡	- fossiliferous (molds/casts), surface	1
-	R9-NQ			fragments exhibit semi planar surfaces	₩	coverage of voids 20%, with very weak to weak (R1 to R2) zones of	
l _	5 ft	47	>10		H	- limestone disaggregated into	
	98%					carbonate sands or silt from	
				88.2, 88.8, 89.3, 89.5' - Fractures or	Н	86.0-86.6' and 87.2-88.1'	1
-			2	mechanical break (4), horizontal, rough,	ш	-	1
_				undulating	╁	-	R9: 7 minutes
_			3	89.4' - Fracture, 45 deg, rough, planar	₽	_	N9. / Illillutes
90	90.0			00.7 - Hacture, 40 deg, rough, planar	ш	L.,	
-49.4			NR)		$\vdash$	No Recovery 89.9-90.0'	Small flazer structure on
-			>10	90.3' - Fracture, 70 deg, rough, planar	世	Limestone 90.0-94.2' - Same as 85.0-89.9'	fragment material,
-				90.7' - Fracture, horizontal, rough, undulating	ш	except highly fossiliferous zone with	bioturbation _
I -			>10	to planar, black organics on surface (or fine laminae controlling break)	$\vdash$	greater density of small voids from	
				90.7-91.2' - Fracture zone		90.8-91.1' (fragments <1"), finer	SC-2 collected at 91.75-
	R10-NQ					grained with decreased density of small voids, weak to medium strong	92.5'
-	5 ft	58	1			(R2 to R3) below 91.1'	1
_	84%			93.0' - Fracture, horizontal, rough, undulating,	╁	-	-
_			2	open	+	<u>-</u>	-
l _				93.5' - Fracture, 25 deg, rough, undulating,	Ш		
			$\left[ \circ \right]$	1/16" open	Н	No Recovery 94.2-95.0'	R10: 12 minutes
95	95.0		NR	93.9' - Mechanical break, horizontal		_ 110 11000 1019 0 112 0010	1
-54.4	95.0			<u> </u>	₩	 Limestone	-
-			2	95.2' - Fracture, 5 deg, planar		- 95.0-98.0' - yellowish gray, (5Y 4/2),	l
_				95.7' - Fracture, 60 deg, rough, planar	┢	variable density of small voids	SC-3 collected at 95.6- 96.8'
			1			(1/16"-1/8") across interval ranging from sparse up to >20% in discrete	90.8
			'		Ш	zones, typically 5%, few larger	1
-	R11-NQ			96.8' - Mechanical break, rough, undulating	t	cavities/fossil molds 1/4" or larger,	1
_	5 ft	62	2	97.3, 97.35' - Fractures (2), 60 deg, rough,		<ul> <li>dark brown/black (organic) inclusions</li> </ul>	-
-	96%			planar	$\vdash$	(1/16"-1/8") and as thin (1/16") fine	-
			>10	97.9' - Fracture, horizontal, rough, nonplanar, brownish black coating on surface (soft)	┢	stringers 98.0-98.7' - fine grained, strong to	
			- 10	98.0-98.7' - Fracture zone, rock fragments,	$\vdash$	very strong (R4 to R5), dense	]
I -			. 40	conchoidal fracture faces, undulating, near	1	98.7-99.8' - Same as 95.0-98.0'	R11: 11 minutes
-			>10	vertical break, few 45-60 deg fractures on	仜	except mild to moderate HCl	-
100 <u> </u>	100.0		NR	fragments 98.9, 99.2, 99.8' - Fractures (3), horizontal, —	$\vdash$	reaction, weak to medium strong (R2 to R3)	-
			>10	rough, undulating		No Recovery 99.8-100.0'	_
				100.0-101.0' - Fracture zone, vertical, rough,	Ш	Limestone	
_				planar to undulating, 3/4"-1" angular rock		100.0-104.5' - Same as 95.0-98.0'	1
-			1	fragments with large (4"-5") long partial core pieces	厂	<ul> <li>except medium strong (R3), increasing density of small voids and</li> </ul>	1
-	R12-NQ			101.3' - Fracture, 70 deg, rough, planar	$\vdash$	larger (up to 1/2") cavities/fossil	-
-	5 ft	33	>10	102.0-102.7' - Fracture zone, limestone	ш	_ molds (10-20%), irregular zones of	-
	90%			fragments	$\vdash$	dark gray (N6) (redox boundary), few	
I -				102.8' - Fracture, 45 deg, rough, undulating	$\sqsubseteq$	fossil molds/casts infilled with soft clayey carbonate material	1
I -			>10	103.3' - Fracture or mechanical break, horizontal, rough, undulating	1—	_ Gayey carbonate material	1
-			>10	103.3-104.5' - Fracture zone, horizontal,	+	-	R12: 6 minutes
_			>10	rough, planar to undulating, partings with 1-2"	匚	No Decement 404 5 405 01	
105	105.0		NR	spacing	Н	No Recovery 104.5-105.0'	



PROJECT NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 2.0	ft bgs	s on 5/	6/07 START: 5/6/2007 END: 5/	23/20	D7 LOGGER : C. Sump, P. De Sa're	go
≥∩≎	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	E RU STH,	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI(	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
EPT SURF	SORE	ROD	RAC ER I	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3.4ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-64.4	014	т.	ш.		7	Limestone	
-			>10	105.2-105.8' - Fracture zone, limestone fragments (1/2"-1-1/2")	Ħ	<ul> <li>105.0-107.5' - grayish orange to light</li> </ul>	-
_					Ħ	olive gray, (10YR 7/4 to 5Y 5/2), mild to moderate HCl reaction, weak (R2),	-
-			>10		Ħ	- <5% coverage of small (1/16"-1/8") ^	-
-	R13-NQ			106.7' - Fracture, 45 deg, rough, undulating 106.8-107.1' - Fracture zone, weak friable	Ш	_ voids on surface, moderately friable	-
_	5 ft 82%	40	0	material, 1/2"-2" fragments, dark brown/black staining (possibly pyrite) on few		_ 107.5-109.1' - yellowish gray to light	-
_	02/0			fragment/fracture surfaces	H	<ul> <li>olive gray, (5Y 7/2 to 5Y 5/2), mild HCl reaction, medium strong (R3),</li> </ul>	1
_			>10	100 7 100 1' Fracture zone rough	囯	small voids (1/16"-1/8") and larger	1
_				108.7-109.1' - Fracture zone, rough, undulating	ш	<ul> <li>cavities/fossils/molds (up to 1/2" max dimension) 5-10% coverage on</li> </ul>	R13: 10 minutes
110	110.0		NR		Н	surface, few fossil casts, partial fine	1
-69.4	. 10.0			— 110.1' - Fracture or mechanical break,	$\sqcap$	— recrystallization No Recovery 109.1-110.0'	
_			2	horizontal, rough, planar 110.7' - Fracture, rough, undulating	H	Limestone 110.0 113.0   Samo as 107.5 100.1	1
_				110.7 - Fracture, rough, undulating  111.3' - Fracture, rough, undulating, fine	H	<ul> <li>110.0-113.9' - Same as 107.5-109.1' except medium strong to strong (R3</li> </ul>	1
			2	limestone fragments	H	to R4), fewer cavities/fossil molds  > >1/4"	1
	R14-NQ 5 ft	57	2	111.6' - Fracture, rough, undulating to partially stepped	Н		
	78%	31		112.0' - Fracture, 70 deg, rough, undulating,	Н		
			1	with thin spalls, black staining/coating on surface (pyrite) somewhat radiased surface	Н	_	
_	]			112.6, 113.7' - Fractures (2), 45 deg, rough,	Д	No Recovery 113.9-115.0'	
_			NR	planar	П	No Recovery 113.9-115.0	R14: 9 minutes
	115.0			445.0 440.01. 5	뮵		_
-74.4			>10	115.0-116.0' - Fracture zone, 1"-3" rock fragments, larger fragments exhibit 30 deg	H	Limestone - 115.0-119.5' - intermingled zones of	_
_				orientation, planar surfaces	H	pale yellowish orange and light olive gray, (10YR 8/6 and 5Y 5/2),	_
_			3	116.1, 116.2' - Fractures or mechanical break (2), horizontal, rough, undulating	H	<ul> <li>moderate HCl reaction, medium</li> </ul>	-
-	R15-NQ			116.5' - Fracture, 75 deg, rough, undulating	Ħ	strong (R3), 5-10% coverage of small (1/6"-1/8") voids on surface,	-
_	5 ft	37	1	to planar 117.0' - Mechanical break, horizontal, rough,	H	<ul> <li>partial recrystallization</li> </ul>	-
-	90%			undulating	Ш	_	-
-			1	118.0' - Fracture, 45 deg, rough, planar 118.5' - Fracture or mechanical break, 15	円	-	-
-			1	deg, rough, planar	円	-	R15: 10 minutes
120	120.0		NR	119.1' - Fracture or mechanical break, rough, undulating	囯	_ No Recovery 119.5-120.0'	
120 <u> </u>	120.0			<del>-</del>	Ħ	Limestone	-
-			1	120.6' - Fracture, 15 deg, rough, planar	丗	<ul> <li>120.0-124.0' - Same as 115.0-119.5'</li> <li>except mild HCl reaction, strong</li> </ul>	
-				121.0' - Mechanical break, rough, undulating	Н	(R4), larger cavities (1/4"-1/2")	
-			4	121.1-121.3' - Fracture zone 121.3' - Mechanical break, rough, undulating	$\sqcap$	<ul> <li>present in discrete zones of variable spacing, most prominent in</li> </ul>	
-	R16-NQ			122.1' - Mechanical break, horizontal, rough,	Ħ	fragmented zones (123.0-123.4'),	1
-	5 ft 80%	55	>10	undulating	Ħ	<ul> <li>blackish brown staining on some fracture/fragment surfaces, minor</li> </ul>	1
_	,			122.9-123.3' - Fracture zone, limestone fragments (1/2"-1-1/2"), dark brown staining	Ш	recrystallization, color becoming	1
			1	on surfaces	Ш	<ul> <li>darker with depth light olive gray (5Y 5/2) to medium olive brown (5Y 4/4)</li> </ul>	1
			ND	123.3, 124.0' - Fractures or mechanical break (2), horizontal, rough, undulating and planar	No Recovery 124.0-125.0'		R16: 11 minutes
125	125.0		NR	( ),	Ш		
1			1 1				



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, NQ tools, HW casing ORIENTATION: Vertical

WATER	LEVELS: 2.0	ft bgs	s on 5	6/07 START : 5/6/2007 END : 5/	23/20	LOGGER : C. Sump, P. De Sa're	go
\$0₽	(%			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-84.4 	R17-NQ 5 ft 78% 130.0	43	4 1 >10 1 NR	125.35, 123.55' - Mechanical break (2), horizontal, rough, undulating 125.7' - Fracture, vertical, rough, undulating, healed fracture, tight 125.75, 125.9' - Bedding plane (2), horizontal, planar 126.0' - Fracture, horizontal, rough, undulating 126.2' - Bedding plane, horizontal, smooth 127.3-127.7' - Fracture zone, irregular limestone fragments, undulating surfaces 128.6' - Fracture or mechanical break, horizontal, rough, undulating		Limestone  125.0-128.9' - yellowish orange to pale yellowish brown, (10YR 8/6 to 10YR 6/2), mild HCl reaction, medium strong to strong (R3 to R4), 10-20% coverage of 1/16"-1/8" small voids on surface, larger oval shaped (fossil molds) cavities (1/4"-1/2") occur variably throughout depth but <5% surface area, very fine grained dense interbeds at 125.75-125.9' and 126.0-126.3' yellowish gray (5Y 7/2), laminated, with <5% small (1/16"-1/8") voids No Recovery 128.9-130.0' Limestone	Fresh fracture faces indicate possible partial recrystallization
- - - - - -	R18-NQ 5 ft i 42%	0	>10 >10 NR	undulating surfaces on most fragments, few horizontal, planar, thin (1/4") bedding plane partings 130.0-130.5', 1/2"-1-1/2" fragments with 2"-4" full diameter core pieces between zones		Limestone  130.0-130.5' - grayish orange to yellowish gray, (10YR 7/4 to 5Y 7/2), moderate HCl reaction, medium strong (R3), thin (3/4") zones of dark gray fine laminations, thin (<25) bedding plane partings  130.5-132.1' - grayish yellow, (5Y 8/4), weak (R2), 15-20% coverage of 1/6"-1/8" small voids, larger (1/4"-3/4") cavities/fossil molds, friable  No Recovery 132.1-135.0'	Driller's Remark: 100% loss of circulation at 132.0' below ground surface, soft drilling, possible void  R18: 4 minutes
	135.0 R19-NQ 5 ft 74%	27	>10 1 >10 1 NR	135.0-135.2' - Bedding plane, horizontal, smooth, multiple 1/4"-1/2" thick partings 135.4' - Fracture or mechanical break, horizontal, rough, planar 136.7' - Fracture, horizontal, rough, planar 136.7' - Mechanical break, rough, undulating 136.9-138.2' - Fracture zone, irregular, undulating surfaces, possible vertical fracture, fine black staining on few fragments 138.2' - Mechanical break, 60 deg, rough, planar		Limestone  135.0-135.2' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCl reaction, finely laminated, bedding plane partings (1/4") 135.2-138.7' - grayish orange to yellowish orange, (10YR 7/4 to 10YR 8/6), mild HCl reaction, medium strong (R3), small voids (1/16"-1/8") exhibit variable density across interval (<5% up to 20+%) partings/breaks concentrate along zones with higher percentage of voids, sparse large cavities (1/4"-1/2") <5% (fossil molds)	Fine black staining on few fractures (pyrite) SC-4 collected at 135.7- 136.6'
-99.4 - - - - - - - 145	R20-NQ 5 ft 60% 145.0	13	1 2 3 NR	140.9' - Fracture, 40 deg, smooth, planar 141.1' - Fracture or mechanical break, vertical, rough, undulating 141.4-142.2' - Fracture zone, limestone fragments <1" 142.5' - Fracture or bedding plane, horizontal, smooth 142.8' - Fracture, vertical, rough, undulating, healed, tight 143.0' - Fracture, rough, undulating, black coating (possibly pyrite) on surface		No Recovery 138.7-140.0'  Limestone 140.0-140.5' - pale yellowish orange, (10YR 8/6), very weak to weak (R1 to R2), 5-7% coverage of 1/16"-1/8" small voids and larger cavities/fossil molds (up to 1/4"), some infilling of cavities with soft white carbonate material	Exhibits "punky" texture on fresh surfaces



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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

00111110	METHODA	ID L	ZOII IV	TEINT . CIVIE 93 S/IN 232345, CIVIE 73 S/IN 232437, ITIUU	otary	, reg toolo, reve odoling	ORIENTATION : Vertical
WATER	LEVELS : 2.0	ft bg	s on 5	/6/07 START : 5/6/2007 END : 5/	23/20	07 LOGGER : C. Sump, P. De Sa're	go
	_			DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	DOOK TYPE OOLOD	
O P E	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<u> </u>	FRACTURES PER FOOT	DECOMI HOW	<u></u>	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
#SE	[ 문문 ]	(%) <sub>Q</sub>		DEPTH, TYPE, ORIENTATION, ROUGHNESS,	ğ	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
두뚜짓	888	ο	R <sub>F</sub>	PLANARITY, INFILLING MATERIAL AND	₩	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
BS급	8개위	æ	RH	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥ	CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
-104.4				145.0-145.4' - Fracture zone, rock fragments	$\mathbf{T}$	140.5-143.0' - very pale yellowish	
_			>10	1/2" thick	-	gray, (5Y 7/2), moderate HCl	-
				145.75' - Fracture, 10 deg, rough, planar	ш	reaction, medium strong to strong	
				3. 3.1	т	(R3 to R4), small zones (<1") of dark	1
-			4	146.3' - Fracture or mechanical break, rough,	+	<ul> <li>gray, fossil molds up to 3/4",</li> </ul>	1
_				undulating		numerous small voids (5%-20%	Disaggregate carbonate -
	R21-NQ			146.4' - Bedding plane, horizontal, rough,	<b>—</b>	surface area) becoming denser, hard	sand 146.8-147.2'
-	5 ft	17	>10	discontinuity with fine grained limestone 146.6' - Fracture, >80 deg, rough, undulating,	┰	below 142.0', black coating on some	1
-	80%			healed	╂┰	fracture faces (pyrite)	-
			3	146.8' - Bedding plane, discontinuity with		No Recovery 143.0-145.0' Limestone	
			ا	yellowish brown, weak, loose, carbonate	ш	145.0-146.8' - yellowish gray, (5Y	
-				sand zone	+	7/2), mild HCl reaction, medium	R21: 15 minutes
-			NR	147.5-147.8' - Fracture zone, vertical,	╁	strong to strong (R3 to R4), small	TAZ I. TO ITIIIIUICO
150	150.0		'"`	limestone fragments 1-1/2"-3"		voids (1/16"-1/8") and larger	
-109.4				147.8, 148.0' - Bedding plane (2), horizontal,	1_	cavities/fossil molds up to 1/2"	-
-			2	smooth	╀	<ul> <li>variable across interval from trace to</li> </ul>	-
_				148.6' - Mechanical break, horizontal, rough,	┢	>10%, thin (1") fine grained beds	
				undulating		show indications of very fine	1
-			>10	148.9, 149.0' - Fractures (2), 45 deg, rough,	╨	laminations	1
_				planar 150.8' - Fracture or mechanical break,	╆╌	146.8-147.2' - medium olive brown, fragmented (1/4"-3/4" size), friable,	_
	R22-NQ		_	horizontal, rough, planar		coarse carbonate sand	
_	5 ft 100%	15	6	150.9' - Fracture, >80 deg, rough, undulating		147.2-147.7' - medium olive brown.	1
-	100%			151.0-152.0' - Fracture zone, mostly rough,	╀	weak (R2)	Weak along laminae, dark -
_			>10	undulating horizontal fractures, few 45 deg	ᅪᆣ	147.7-149.0' - Same as 145.0-146.8'	laminations may be
			10	rough, planar fractures, limestone fragments		except light olive gray, (5Y 5/2)	biofeature (algae)
-				3/4"-2-1/2" in length		No Recovery 149.0-150.0'	R22: 15 minutes
-			>10	152.0, 152.1, 152.3, 152.5, 152.7, 152.9' -	₩	Limestone	-
155	155.0			Fractures (6), horizontal, rough, undulating	$\vdash$	150.0-152.8' - Same as 145.0-146.8'	
-114.4				153.0-154.0' - Fracture zone, horizontal, rough, undulating, partings controlled by		except light olive gray, (5Y 5/2), mild HCl reaction, medium strong (R3)	
-			2	bedding lamination	┰	152.8-153.9' - mottled grayish yellow	1
_				154.0-155.0' - Fracture zone, 20-45 deg,	ᅪ	and light olive gray, (5Y 8/4 and 5Y	_
				rough, undulating		5/2), medium strong (R3), thin (1"-2")	
-			3	155.3' - Fracture, 15 deg, rough, planar	$oxed{\Box}$	dark yellowish brown (10YR 4/2) fine	1
-			<b>—</b>	155.4, 155.6' - Fractures (2), 10-15 deg,	+-	<ul> <li>wavy laminations, dark laminations</li> </ul>	-
I _	R23-NQ 5 ft	25	>10	rough, undulating	╨	slightly inclined (5-10 deg)	l J
1	68%	20	10	156.5' - Fracture, horizontal, rough, planar	Н	153.9-155.0' - Same as 150.0-152.8'	]
-	55,3		>10	156.6' - Fracture, rough, undulating	亡	except strong (R4), denser, fewer	1 1
I -			- 10	156.8' - Fracture, horizontal, rough, planar 157.2' - Bedding plane, 4-5 deg, break on	$\bot$	voids	-
				fine grained layer	$\bot$	155.0-156.3' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), strong	
1			NR	157.2-158.4' - Fracture zone, horizontal,	Ľ	(R4), mottled appearance, <5-10%	R23: 11 minutes
1				planar, rock fragments 3/4"-2" in length	皿	coverage of 1/16"-1/8" small voids	-
	160.0				╁┈	and larger cavities/fossil molds up to	
-119.4			ا مد ا		H	1/2" increasing with depth, dense	
-			>10		T	156.3-158.4' - Same as 155.0-156.4'	1
-					+	<ul> <li>except increasing percentage of</li> </ul>	-
I _			1	161.3' - Fracture, 75 deg, undulating, slightly	╨	small voids uniformly distributed,	l J
				radial, 6" long	$\vdash$	color darkening to medium olive	
1 -	R24-NQ		0	, <del>.</del>	亡	brown (5Y 4/4), very fine laminated dense interbed at 157.6-158.1'	The rig CME 55 (S/N
-	5 ft	0	$\vdash$		$+$ $\square$	No Recovery 158.4-160.0'	252345) was changed to
1	50%	-			$\vdash$	Limestone	CME 75 (S/N 252437) at
1 -					╁	160.0-162.5' - light olive gray to olive	depth 162 feet below
-			,,		仜	gray, (5Y 5/2 to 5Y 3/2), medium	ground surface -
-			NR		+	strong (R3), dense, few small voids	Ř24: 10 minutes
					$\vdash$	or cavities/fossil molds (<5%)	Core barrel stuck at 162.3'
105	165.0				T	No Recovery 162.5-165.0'	1
165	165.0			_	+	-	_
1	i l		ı			Ī	i l



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT: CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, NQ tools, HW casing ORIENTATION: Vertical

WATER	LEVELS : 2.0	ft bgs	s on 5/	6/07 START : 5/6/2007 END : 5/3	23/20	D7 LOGGER : C. Sump, P. De Sa're	go
≥∩≘	. (%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU STH, OVEF	D (%)	T. 05	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
EPT SURF SLEV	CORE	RQD	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-124.4	0716	Ľ	ша	165.0-166.1' - Fracture zone	S	Limestone	5/9/07, 14:00 hrs - Rig
-			>10	105.0-100.1 -1 lacture 2011e		- 165.0-167.4' - medium dark gray,	changed to one with a -
_				-	₽	(N5), fine grained, mild HCl reaction,	cathead to allow pull-back
_			>10	166.35' - Fracture, <10 deg, rough,	$\blacksquare$	strong (R4), 10-15% coverage of small (<1/8") voids, 10% coverage of	hammering 16:00 hrs - Only 10' of rods -
_				undulating, 1/8"-3/16" relief	П	1"-1-3/8" fossil molds/cavities, trace	removed, decide to
_	R25-NQ 5 ft	0	8	166.35-165.55' - Fracture zone, vertical, rough, planar, <1/16" gray carbonate infill		carbonate infill of cavities, light olive gray (5Y 6/1) coloration of fractured	overdrill with HQ tools 16:20 hrs - Start installing -
_	76%	·		166.6' - Fracture, horizontal, smooth, planar	F	surfaces	HQ
_			>10	166.8, 166.9, 167.0, 167.2' - Fractures (4), <10 deg, smooth, undulating -		167.4-168.8' - medium dark gray to yellowish gray, (N5 to 5Y 5/2), fine	19:00 hrs - HQ tools will not go through 4" bit, HQ -
				167.4, 167.8, 167.9' - Bedding plane (3),	Н	grained, mild to moderate HCl	tools pulled and resumed
			NR	horizontal, smooth, planar 167.7' - Mechanical break		reaction, medium strong to strong (R3 to R4), trace to 10% coverage of	back hammering Driller's Remark: Core
170	170.0			167.9-168.8' - Fracture zone		1/16" voids increasing with depth,	barrel retrieved, hole
-129.4			8	170.0-170.2' - Fracture zone	Н	visible casts/cavities No Recovery 168.8-170.0'	currently cased from 0-60' with HW casing
			8	170.2-170.8' - Fracture, 60 deg, smooth, undulating	$\vdash$	Limestone	Driller's Remark: extending
_				170.8' - Mechanical break	Ħ	170.0-170.2' - Same as 165.0-167.4' 170.2-171.1' - Same as 165.0-167.4'	HW casing to 90' Driller's Remark: HW
_			>10	170.95-171.25' - Fracture zone - 171.4, 171.6, 172.05, 172.2, 173.1, 173.45,	Н	except no visible casts/cavities	casing installed to 90', NQ
_	R26-NQ			173.8, 174.2' - Fractures (8), <10 deg, rough,	ш	171.1-172.1' - Same as 165.0-167.4' 172.1-174.5' - Same as 167.4-168.4'	rod and tri-cone bit
-	5 ft 90%	7	>10	undulating 172.4-172.6' - Fracture zone	ш	except size of large casts/cavities up	equipped to reach _ sampling depth of 165'
_	30,0			172.8-173.0' - Fracture zone	ш	to 1-3/16"x3/4" over 30% of rock at	P. De Sa'rego begins
_			6	-	Н	_ 173.5-174.5'	logging _ R25: 28 minutes
-			1	-	Ħ	_	Driller's Remark: Chatter
475	475.0		NR	-	Ш	No Recovery 174.5-175.0'	approximately 145' Driller's Remark: Chatter
175 <u> </u>	175.0		IVIX	175.0-176.1' - Fracture zone	₽	Limestone	approximately 150'-155' —
-			>10	-	ш	- 175.0-176.0' - pale yellowish brown	Driller's Remark: Chatter at _ approximately 160'
-				-	口	to dark gray, (10YR 8/2 to N3), fine grained, mild HCl reaction, medium	R26: 24 minutes -
-			>10	176.35, 176.45, 176.7, 176.75, 176.8' -	Н	<ul> <li>strong to strong (R3 to R4), trace</li> </ul>	Driller's Remark: Chatter Driller's Remark: Chatter
-	R27-NQ			Fractures (5), horizontal, smooth, planar to undulating	H	voids up to 1/16" in size, 10-15% coverage of 1-3/16"x3/8"	-
-	5 ft	8	2	176.45-176.7' - Fracture zone	Ë	<ul><li>casts/cavities, with infill/</li></ul>	-
-	58%			176.8-177.0' - Fracture zone 177.4' - Fracture, horizontal, rough, planar to	世	recrystallization of yellowish brown, fine to medium grained carbonate	-
-				undulating -	F	<ul> <li>176.0-177.9' - pale yellowish brown,</li> </ul>	-
-			NR	177.75' - Fracture, 60 deg, rough, undulating	厂	(10YR 8/2), fine to medium grained, mild to moderate HCl reaction,	R27: 58 minutes
-					士	medium strong (R3), 10-15%	-
180 <u> </u>	180.0				$\vdash$	coverage of <3/16" voids No Recovery 177.9-180.0'	 Driller's Remark: Chatter
- 100.4			>10	-	F	_ Limestone	Dillici S Nemaik. Challet
_				180.75-180.9' - Fracture zone, possibly due	片	180.0-184.5' - Same as 176.0-177.9' except 40-50% casts/cavities at	Drillaria Damaria Chattar
_			6	to cavities in rock 181.2' - Fracture, horizontal, smooth to	₽	_ 180.75-181.1' and 183.7-183.9' (up	Driller's Remark: Chatter -
_				rough, undulating, 1/4"-3/8" relief	F	to 1-3/16"x9/16"), and highly fossiliferous with 50% voids up to	_
_	R28-NQ 5 ft	20	>10	181.5, 181.55' - Fractures (2), 25 deg, smooth, planar, along laminae of darker	口	_ 1-3/16" at 183.1-184.1' and thin	]
_	90%	_•		material	$\vdash$	(1/16"-3/16") dark laminae from 181.4-182.4'	]
			>10	181.75, 181.80' - Fractures (2), <10 deg, rough, undulating, 1/4"-3/8" relief	厈	- 101. <del>4-</del> 102.4 -	
			- 10	182.0-182.2' - Fracture zone	片		]
			1	182.4' - Bedding plane, smooth, planar, 1/8"	$\vdash$		R28: 46 minutes
185	185.0		NR	relief 182.5-182.9' - Fracture zone	oxdot	No Recovery 184.5-185.0'	



PROJECT NUMBER:	BORING NUMBER:				
338884 FI	Δ-13	SHEET	11	OF 1	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722927.1 N, 457933.5 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 55 S/N 252345; CME 75 S/N 252437, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 2.0	) ft bgs	s on 5	/6/07 START : 5/6/2007 END : 5/	23/20	D7 LOGGER : C. Sump, P. De Sa're	90
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-144.4 - - -			>10	183.2-183.9' - Fracture zone 184.1' - Bedding plane, horizontal, rough, planar 185.2-185.9' - Fracture zone 186.0' - Mechanical break 186.3' - Fracture, horizontal, rough,		Limestone  185.0-187.6' - pale yellowish brown, fine to medium grained, mild to moderate HCI reaction, medium strong to strong (R3 to R4), 10% coverage of <3/16" voids, trace	- - -
-	R29-NC 5 ft 86%	22	3 >10	undulating, 3/8" relief, <1/16" carbonate infill 186.4' - Mechanical break 186.7-186.95' - Fracture zone 187.5' - Fracture, <5 deg, smooth, undulating		casts/cavities up to 9/16"x3/8" with partial carbonate recrystallization on surfaces	- - -
-				187.8' - Fracture, <5 deg, rough, undulating, <1/8" relief 187.95' - Fracture, horizontal, rough,		187.6-189.3' - Same as 185.0-187.6' - except 15-35% voids up to 1/8" increasing with depth, with trace casts/cavities up to 9/16"x1"	- R29: 37 minutes
190 -149.4	190.0		NR	undulating, <3/16" relief 188.2-188.4' - Fracture zone 188.55, 188.9, 189.0, 189.1, 189.15' -	Ħ	No Recovery 189.3-190.0' Limestone	- 
-			>10	Fractures (5), horizontal, smooth, planar to undulating, 1/16" relief 190.0-190.55' - Fracture zone	Ė	<ul> <li>190.0-193.6' - Same as 175.0-176.0'</li> <li>except 10-15% voids up to 3/16" and black laminations from 190.5-192.3',</li> </ul>	-
-	R30-NG		>10	190.9-191.1' - Fracture zone 191.3' - Fracture, 15 deg, smooth to rough, undulating	E	increased (50% by volume) carbonate infill of cavities and casts	- -
-	5 ft 72%	8	>10	191.5-191.6' - Fracture zone 191.8-192.1' - Fracture zone 192.3' - Fracture, 30 deg, rough, undulating	H	-	- -
-			NR	192.4-192.6' - Fracture zone, 60 deg, smooth to rough, undulating, gray staining over <10% of fracture surface 192.95' - Fracture, 30 deg, smooth to rough,		No Recovery 193.6-195.0'	R30: 51 minutes -
195_ -154.4 - - - -	195.0 R31-NG		>10	undulating, gray staining over 75% surface 193.15-193.3' - Fracture zone 195.0-195.4' - Fracture zone 195.7-196.0' - Fracture zone  196.3-196.8' - Fracture zone or mechanical break, 40 deg, rough, undulating, pale yellowish brown recrystallization (carbonate,		Limestone  195.0-196.1' - yellowish gray, (5Y 7/2), fine to medium grained, mild HCI reaction, strong (R4), 40-50% lenses of medium dark gray (4N), 5% coverage of small (1/16") voids on surface, trace casts/cavities up to	
-	5 ft 36%	16	NR	fine to medium grained) on 100% of surface, 3/16"-3/8" relief		- 3/8"x3/8" 196.1-196.8' - Same as 175.0-176.0' except 5-10% casts/cavities up to 9/16"x1-3/16" No Recovery 196.8-200.0'	fluid loss at 196' - - -
	200.0			-			R31: 15 minutes
-159 <u>.4</u> - -						Bottom of Boring at 200.0 ft bgs on 5/23/2007	-
-						-	- - -
-						-	-
-					1	-	-



PROJECT NUMBER:	BORING NUMBER:					
338884 FI	Δ_1/4	CHEET	1 1	ΛE	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

WATER	LEVELS	: 1.7 ft bg	gs on 03/2	20/07	START : 3/14/2007 END : 4/9/2007 LOGGEF	R : C	Wallestad
				STANDARD	SOIL DESCRIPTION		COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLIC LOG	
YCE,		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH JRFA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	ΥMB	INSTRUMENTATION
10.4				(N)		်	40:05 Danas dellias
42.4						1	16:35 - Began drilling
_						4	_
_						1	
_						1	
_						4	_
_						4	
_	3.5				Silty Sand (SM)	100	6" alough removed for photo
_				2-2-1	3.5-5.0' - dark yellowish orange to light brown, (10YR	4	6" slough removed for photo
-		1.5	SS-1	(3)	6/6 to 5YR 5/6), wet, very loose, fine grained, no HCl reaction, 20-25% nonplastic fines, trace medium to	-	-
5 <u> </u>	5.0				coarse grained sand-sized iron-cemented concretions	4111	4 -
- 57.4						-	-
-						-	-
-						┨	-
_						1	-
-						┨	-
-	0.5					┨	-
_	8.5				Clayey Sand (SC)	1//	-
-		1.2	SS-2	3-4-5	8.5-9.7' - very light gray, (N8), wet, loose, fine grained,	1//	-
10	10.0	'	002	(9)	no HCl reaction, 30% medium plastic fines, trace organics (roots), trace green mineral	<b>*</b> ///	-
32.4	10.0					1	-
-						1	-
-					-	1	1
_						1	1
_						1	1
-						1	1
	13.5					1	]
					Clayey Sand (SC)		1
		1.3	SS-3	1-3-5 (8)	13.5-14.0' - medium light gray, (N6), wet, loose, no HCI reaction, fine silica sand with 3 distinct CH layers		] 1
15	15.0			(5)	at 13.5-13.55', 13.7-13.75', and 13.8-14.0'; CH is \ \text{greenish gray (5G 6/1) to greenish black (5GY 2/1),}	Ш	1
27.4					highly plastic	_	
					Silt (ML) 14.0-14.8' - grayish orange, (10YR 7/4), wet, medium	_	
					stiff, nonplastic, rapid dilatancy, strong HCl reaction,	_	
_					carbonate material	1	
_						1	
_						1	
_	18.5				- 01 0 1/00		47.00 01 11.00
_				2-4-2	Clayey Sand (SC) 18.5-18.6' - very light gray, (N8), wet, loose, fine	1	17:30 - Stopped drilling for the day at 20'
_		1.3	SS-4	(6)	$\lfloor \                                   $	1//	_
20_	20.0				plasticity fines, silica sand	1//	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-14	SHEET	2	OF	12

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

DNILLIN	GIVIETH	OD AND	EQUIPM	ENT : CME 55 S/I	N 299205; Dietrich D-50 S/N 240, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 1.7 ft bo	gs on 03/2	20/07	START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad
I				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		RECOVE	RY (ft)	1201 HEODETO	SOIL NAME, USCS GROUP SYMBOL, COLOR,
TH VAT				6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR ONSISTENCY, SOIL STRUCTURE, MINERALOGY SINSTRUMENTATION
			#TYPE	(N)	Solve of the state
22.4				` '	Poorly Graded Sand (SP)   Began drilling on 3/15/07 at 08:25
-					\\\18.6-19.4' - very light gray, (N8), wet, loose, fine
_					grained, <5% fines, no HCl reaction, silica sand
_					Clayey Sand (SC)   19.4-19.8' - very light gray, (N8), wet, loose, fine   -
_					grained, 30% fines, medium to high plasticity, no HCl / 📘
_					reaction, silica sand
-	23.5				<b>1</b>
-	20.0				Clayey Sand (SC)
-		1.2	SS-5	5-7-8	23.5-24.6' - medium light gray, (N6), wet, medium
-		1.4	33-5	(15)	dense, fine grained, no HCl reaction, 22% medium  ¬ plastic fines, trace very fine sand-sized black
25 <u> </u>	25.0				√minerals, CH lenses at 23.55-23.6', 24.2-24.25' and
17.4					\\24.55-24.6'
					Silt (ML)
					\24.6-24.7' - grayish orange, (10YR 7/4), wet, stiff, nonplastic, rapid dilatancy, moderate HCl reaction,
-					10% fine sand, all carbonate material Driller's Remark: Shallow rock ledge or
-					- bedrock -
-					
-					
-	28.5				CHARLO LAND
_				F 0 00	Silt With Sand (ML) 28.5-29.6' - grayish orange, (10YR 7/4), wet, hard, low -
		1.1	SS-6	5-8-29 (37)	plasticity, slow to rapid dilatancy, 15% fine sand,
30	30.0			(01)	5-10% medium to coarse sand, lenses of coarse sand
12.4					\at 28.6' and 29.4-29.6', 1" limestone fragment near bottom of sample; Sandy Fat Clay (CH) lenses at
-					28.65' and 29.0'
-					-
_					
_					
_					
	33:5			ĺ	]
	-33:D	0.1	SS-7	50/1.5	Sandy Silt (ML)
-				(50/1.5")	\ 33.5-33.6' - dark yellowish orange, (10YR 6/6), wet, hard, nonplastic, rapid dilatancy, moderate HCl
-					reaction, 40-45% fine to coarse grained sand, all
35 7.4					carbonate material — Driller's Remark: Lost circulation at 36.5' at
'					- 10:07 -
_					36.5-38.5' Intermittent medium chattering
					37.0-38.5' Hard/slow drilling
					] [
					<b>1  </b>
-					1
-					-
-	38.5 38.8	0.0	SS-8	50/3	Limestone Fragments 12:25 Set 6" diameter casing to 8.5' and 20'
_		\	33-0	(50/3")	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
_					reaction, fragments up to 1/2", voids up to 1/16" over / _ 14:30 - End drilling on 3/15/07
40					\15-20% of surface
1				ĺ	I I



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-14	SHEET	3	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

WATER	LEVELS	: 1.7 ft bo	gs on 03/2	20/07 S	TART : 3/14/2007 END : 4/9/2007 LOGGE	ER :	. C.	Wallestad	
				STANDARD	SOIL DESCRIPTION	П		COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			SYMBOLIC LOG		
4 BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SOLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
EPT URF/ LEV			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		YMB	INSTRUMENTATION	
2.4				(N)		+	0)	Water level at 1.7' at 12:30 on 3/20/07	
-						1		Driller's Remark: Set HW casing from 20-38' -	
-						1		at 15:00 Driller's Remark: Begin drilling from 38.5'	
-						1		with AWJ rod and 2-7/8" tricone bit (new bit) - at 15:20	
-	42.5					1		_	
-	42.5 42.8	0.2	SS-9	50/3	Silt With Limestone (ML)	Ŧ	ш	SS-9 collected from 42.5' to 44.0'	
-				(50/3")	42.5-42.65' - light olive gray, (5Y 5/2), wet, low plasticity, mild to moderate HCl reaction, medium to	/1		_	
					coarse sand-sized and fine gravel-sized limestone, voids up to 1/16" in diameter covering 15-25% of	1			
_					surface, no visible casts or molds	4		_	
45					-	4		Drillanda Dannandu Tannand bala ak 50 51 41	
-2.6						4		Driller's Remark: Tagged hole at 52.5', 1' short of presumed depth on 3/21/07	
-						4		at 08:40; Assuming change in bit on morning of 3/20/07 reconciles loss of 1' in measured	
-						+		depth –	
-						$\exists$		-	
-	47.5 47.9	0.3	SS-10	50/4.5	Sandy Silt (ML)	+	Ш	SS-10 collected from 47.5-49.0'.	
-	17.0		00.10	(50/4.5")	47.5-47.75' - pale yellowish brown, (10YR 6/2), wet, hard, nonplastic to low plasticity, rapid dilatancy, mild	Æ		16:45 Stopped drilling at 53.5' for the day on - 3/20/07	
-					to moderate HCl reaction, 30-35% fine to coarse	1			
-					sand, all carbonate material	1		-	
50						1		-	
-7.6					-			Driller's Remark: Reamed borehole from 38.5' to 52.5' with 3-7/8" tricone bit on -	
						]		3/21/07	
_						1		At 08:50; hole tagged at 52.5'	
_						4		_	
-						4		_	
-						4		-	
-	53.5				Sandy Silt (ML)	+	П	-	
-		1.3	SS-11	33-50-50/4	53.5-54.8' - moderate vellowish brown, (10YR 5/4).	+		-	
	54.8			(100/10")	wet, hard, low plasticity, slow to rapid dilatancy, mild HCl reaction, 30% fine to medium grained sand, 3/16"	1		-	
55 <u> </u>					thick grayish black (N2) organic lens at 53.75', other irregular organic lenses and stringers throughout	H		_	
-					sample	1		-	
-						1		-	
_						1			
-						]		]	
] ]						]			
_	58.5					1			
_		0.9	SS-12	26-50/5 (76/11")		1			
-	59.4			(10/11)	٦	$\forall$	Щ	-	
60						Ц			



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-14	SHEET	4	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

WATER	LEVELS	: 1.7 ft bo	gs on 03/2	20/07	TART : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallesta	d
				STANDARD	SOIL DESCRIPTION	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	EDTIL OF CACING PRILLING DATE
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR,  MOISTURE CONTENT, RELATIVE DENSITY OR  DENSITY OR	PTH OF CASING, DRILLING RATE, RILLING FLUID LOSS, TESTS, AND
EPT URF LEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	INSTRUMENTATION
 -17.6				(IN)	Silt (ML)	
-					58.5-59.4' - moderate yellowish brown, (10YR 5/4), wet, hard, low plasticity, rapid dilatancy, mild to	-
-					moderate HCl reaction, 10-15% very fine to fine	-
-					grained sand, trace black particles, carbonate material	-
-					Indienal –	-
-					1	-
_	63.5				11	_
_	63.9	0.4	SS-13	50/5	Silt With Sand (ML)	_
				(50/5")	63.5-63.9 - Same as 58.5-59.4' except dark yellowish / orange, (10YR 6/6), up to 20% fine to medium sand	_
65						
-22.6					] [	
_					<u> </u>	
_					<u> </u>	
_					Driller' - chatte	s Remark: 66.5-67' hard layer, light -
_					_	_
-					4 1	_
_	68.5			05 50/4	Silty Sand With Limestone Lenses (SM)	=
-	69.3	0.7	SS-14	25-50/4 (75/10")	68.5-69.15' - moderate yellowish brown, (10YR 5/4),	-
-	00.0			( 2. 2 )	wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 25% low plasticity fines,	-
70 <u> </u>					around 50% of sample is limestone lenses up to 1" in	s Remark: Slow drilling and moderate
-					size, voids up to 1/16" in size over 5-10% of surface, all carbonate material	ring, hard rock -
-						-
-					† <b>†</b>	-
-					<b>†  </b>	-
-					<b>†  </b>	7
-	<del>7</del> 3:ā				1	
-	/3.0	0.0	SS-15	50/1 (50/1")	Limestone Fragments  70.5.70.551. Fragments up to 1/0" in size with Silly.	s Remark: Advance HW casing from
				(50/1)	\\ 73.5-73.55' - Fragments up to 1/2" in size, with Silty \\ Sand (SM) as in 68.5-69.15' \\ \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	0 73.5
75						
-32.6					<u> </u>	
_					<u> </u>	_
_					] ]	_
_						4
-					11	4
-						-
-	78.5	0.0	SS-16	50/5	Limestone Fragments	-
-	78.9	0.0	33-10	(50/5")	\ 78.50-78.55' - moderate yellowish brown, (10YR 5/4), /-	-
-					mild HCl reaction, up to 1/2" in size, voids up to 1/16" / over 50-70% of surface, no visible fossils or cavities	-
80						



PROJECT NUMBER:	BORING NUMBER:	
338884 FI	Δ-14	SHEET 5 OF 12

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

WATER	LEVELS	: 1.7 ft bo	s on 03/2	20/07	TART : 3/14/2007 END : 4/9/2007 LOGGER	: C.	Wallestad
				STANDARD	SOIL DESCRIPTION	g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LICCS OPOLID OVARDOL COLOD	SYMBOLIC LOG	DEDTIL OF CACING PRILLING PATE
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30 Li	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPT SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYME	INSTRUMENTATION
-37.6				(14)		۳	Driller's Remark: 81.5-82.5' soft rock
-					-	İ	Driller's Remark: 82.5-83.5' hard, heavy - chattering
-					-	1	]
						1	Driller's Remark: Stopped drilling at 83.5' at - 18:10
_					<u>-</u>	1	Driller's Remark: Start SPT with AWJ rod on -
_					_		3/22/07 at 08:10
_	83.5				Cillar Cound Mitch Limontone (CNA)		_
_	04.4	0.0	SS-17	37-50/5 (87/11")	Silty Sand With Limestone (SM) 83.5-83.55' - moderate yellowish brown, (10YR 5/4),	l	-
	84.4			(07,11)	wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 29% low plasticity fines, 50%	l	-
85 <u> </u>					of sample is gravel-sized limestone fragments up to 1/2" in size, voids up to 1/16" over 40-60% of surface,	l	_
-					all carbonate material	l	-
-					-	ı	-
-					-	İ	1
						1	Driller's Remark: 87.5-88.0' heavy chatter,
						l	Halu Tock
_	88.5 88.8	0.0	00.40	F0 /0		<u> </u>	_
_	00.0	0.0	SS-18	50/3 \ (50/3") /	Limestone Fragments 88.50-88.55' - pale yellowish brown, (10YR 6/2),	1	-
-					moderate HCl reaction, very poor recovery, fragments up to 1/2", voids up to 1/16" over 15-25% of surface,		-
90 <u> </u>					moderately fossiliferous, no visible cavities	l	Driller's Remark: 90.0-93.5' moderate
-					-	l	chatter, slow drilling, hard rock -
-					-	l	-
_					-	İ	1
						1	
						1	
_	93.5 93.8	0.1	00.40	F0/0	0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<b>.</b>	_
-	33.0	0.1	SS-19	50/3 (50/3")	Sandy Silt With Limestone (ML) 93.5-93.6' - grayish olive, (10YR 4/2), wet, hard, very		-
					dense, low plasticity, moderate HCl reaction, 30% fine to medium grained sand, pale yellowish brown (10YR	1	-
95 <u> </u>					6/2) limestone lenses up to 1/4" thick	l	_
-					-	l	-
-					7		-
					-	1	
					Ī		]
	98.5					L	]
_	98.9	0.3	SS-20	50/5 (50/5")	<b>Limestone</b> ¬ 98.5-98.8' - pale yellowish brown, (10YR 6/2),	H	_
-				()	moderate HCl reaction, limestone fragments up to 1/2"x3/4"		_
-					Begin Rock Coring at 98.4 ft bgs		-
100					See the next sheet for the rock core log	$\vdash$	-
						L	



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-14

SHEET 6 OF 12

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

				MENT : CIVIE 33 3/IN 299203, DIEUICH D-30 3/IN 240, ITIU0		,, <u>.</u>	ORIENTATION : Vertical
WATER	LEVELS: 1.7	ft bg	s on 0	3/20/07 START : 3/14/2007 END : 4/	9/2007	LOGGER : C. Wallestad	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		(0	DESCRIPTION	SYMBOLIC LOG		
UNA NA NA NA	지수도 I	_	꽃	DESCRIPTION	_ □	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H A S E	동돈씨	(%) О	150	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	9	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
[ 문문]	8888 8888	ο	AC R F	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
BSH	8개품	æ	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥ	CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
	98.4				1	Limestone	Water level 2.9' below
I _			>10	00 0 00 01 5 1 (0)		98.4-102.6' - yellowish gray, (5Y 7/2),	ground surface on 3/23/07
				98.9-99.2' - Fracture zone (2), rough,	ш	fine to medium grained, strong HCI	at 08:20, borehole depth at
l				undulating, 1-3/4"x1-3/4" fragments, many fracture orientations	╁┼	reaction, very weak to medium	98.5'
100_			5	99.4' - Fracture or mechanical break, 20 deg,	$\vdash \vdash$	strong (R1 to R3), 40% of rock	Driller's Remark:
-57.6				rough, undulating, potential mechanical		mottled with irregularly shaped	Assembled NQ coring
_	R1-NQ			break, tight, fossils on surface	Ш	infilled cavities (bioturbation zones),	assembly (NW casing with
-	5 ft	10	>10	99.6, 99.75, 99.95' - Fractures or mechanical	Н	voids (1/16") over <5% of surface	attached drill bit is 8.15'
_	83%			break (3), 30, 90, 90 deg, smooth, undulating	Н	(25-50% in bioturbated zones), up to 1/4"x3/4" trace fossils, highly	long) Driller's Remark: At 98.5'
			>10	100.15-101.1, 101.6-102.6' - Fracture zone		fractured, many discontinuities; very	switch to NQ rock coring
-			/10	(4), 45 deg, smooth, undulating, 1"-3"	ш	weak rock from 98.4-99.2',	assembly at 10:25, length
_			>10	fragments, broken along weaker rock	$\vdash$	- 100.15-101.1' and 101.6-102.6'	from kelly down position to
I			$\bigcap$		ГН	No Recovery 102.6-103.4'	ground is 3.3'
	103.4		NR		Ш	• • • • • • • • • • • • • • • • • • • •	Start coring at 11:50
-					╁┼┼	Limestone	R1: 19 minutes -
_			1	103.8' - Fracture, 15 deg, smooth, undulating,	Н	_ 103.4-107.5' - grayish orange, (10YR	<u> </u>
				potential mechanical break, tight	Ш	7/4), medium grained, moderate to	
405				104.5' - Fracture or mechanical break, 20		strong HCl reaction, medium strong	1
105 <u> </u>			>10	deg, rough, stepped to undulating, tight —	₩	(R3), voids (1/16") over 0-20% of	_
-02.0				104.7-104.9' - Fracture zone (2), 1/2"-1-1/2"	ы	surface in mottled pattern, fossils up	
	R2-NQ	30	>10	fragments, multiple orientations		to 1/4"x1/2" over 5-10% of surface	
-	5 ft 82%	30	/10	104.9' - Fracture, 70 deg, smooth, undulating,	ш	-	1
_				open	₩	-	-
			>10	105.0' - Fracture or mechanical break, 80 deg, smooth, undulating, open, intersects	Н		
				104.9' fracture	Ш	-	1
-			0 /	105.1' - Fracture, <10 deg, rough, undulating,	╁	No Recovery 107.5-108.4'	R2: 18 minutes
_			NR	open	₽	-	_
	108.4			105.2' - Mechanical break, 45 deg, rough,	Ш		
_				undulating, open 1/2" to tight		Limestone	1
-			6	105.5' - Fracture, 50 deg, smooth, undulating	₩	108.4-112.8' - moderate yellowish	-
_				106.1-106.9' - Fracture zone (2), fragments	Н	brown, (10YR 5/4), medium grained,	
110			5	up to 1"x2", multiple orientations, tight to		moderate to strong HCl reaction, medium strong (R3), voids (1/16")	
-67.6			5	open 1/4" — 107.1' - Fracture, 55 deg, smooth, undulating,	ш	over 35-45% of surface, fossil casts	
_	R3-NQ			tight	$\vdash$	up to 1/4"x1/2" over <5% of surface	-
	5 ft	38	2	107.3' - Fracture, 45 deg, rough, undulating	Н	up to x., = 0.0. 0, 0.0 0.1 0.1 0.1	
	88%			to stepped, tight			1
-				108.5' - Fracture, 70 deg, rough, undulating,	┧	-	1
-			5	loose	₽₽	-	1 -
				108.8' - Fracture, 20 deg, rough, undulating	Ш		1
1			0	to stepped, loose		-	R3: 15 minutes
-			NR	108.9-109.1' - Fractures (2), 5 deg, rough,	₩	No Recovery 112.8-113.4'	1
-	113.4			undulating, tight 109.0' - Fracture, 80 deg, smooth, undulating,	Н	Limostono	Driller's Remark: 115-
			1	black staining (crystal faces) on surface, tight		Limestone 113.4-118.2' - Same as 108.9-112.8'	115.5', void, lost
-				to open 1/4"	ш	_ 110.7-110.2 - Came as 100.5-112.0	circulation, using more
-				109.7' - Fracture zone, black staining, up to	╂┼┼	-	pressure to drill
115_			4	1/2"x1-1/4" fragments	Н		SC-1 collected at 114.8-
-72.6				109.9-110.2' - Fractures (2), 80 deg, rough,	$\square$		115.9'
1 -	R4-NQ			undulating, loose	┧	-	· · · · · · ·
-	5 ft	82	1	110.0' - Fracture, 70 deg, same as 109.9'	₽₽	_	-
	96%			110.1' - Fracture or mechanical break, 5 deg,	Ш		
				rough, stepped, tight 110.7' - Fracture, 10 deg, rough, undulating,	ш	-	1
-			1	open	╙	-	1
I -				110.9' - Fracture, 10 deg, rough, undulating,	$\vdash$	_	B4: 10 minutes
			1	black metallic crystals, tight to open 1/8"			R4: 10 minutes Stop drilling for day at
-	118.4			and the second s	Ш	-	17:10 on 3/23/07 at 118.4'
	. 10.7				$\Box$		on 6/20/07 at 110.4
1							



PROJECT NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

WATER	LEVELS: 1.7	ft bgs	s on 0	3/20/07 START : 3/14/2007 END : 4/9	9/2007	7 LOGGER : C. Wallestad	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ËS	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	E RU STH,	(%) Q	T.00-	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
EPT SURF	SORE	RQD	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3 V ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-	0	ш.	NR/	111.6-111.7' - Fractures or mechanical break	0)	No Recovery 118.2-118.4'	Start drilling on 3/24/07 at
_			>10	(2), 5 deg and 70 deg, rough, undulating,	Н	Limestone	08:05
				tight 111.8-111.9' - Fractures (2), 10 deg and 70	H	118.4-122.0' - Same as 108.9-112.8' except voids up to 1/16" over 15-25%	Still no circulation -
120_ -77.6			>10	deg, smooth, undulating, tight 112.8-113.4' - Fracture zone (2), 1"x1-1/2"	H	of surface	Driller's Remark: 121.4 121.6' small void
-	R5-NQ		4.0	fragments	Ħ	-	-
-	5 ft 72%	20	>10	114.2-114.4' - Fracture zone (2), 1"x1-1/2" _ fragments	Ш	_	-
_			4	114.5-114.6' - Fractures (2), 30 deg, smooth, undulating, intersecting, tight to open 1/4"	Н	_	-
_				114.65-114.8' - Bedding plane or mechanical	Н	No Recovery 122.0-123.4'	-
_			ND bi	break (2), horizontal, smooth, undulating, tight to open 1/4"	Ħ	<u> </u>	R5: 9 minutes
	123.4			115.9' - Fracture, same as 114.65', tight	Ш	- -	1
			9	117.3' - Fracture, 45 deg, smooth, undulating to stepped, tight	Ш	Limestone 123.4-125.9' - Same as 108.9-112.8'	1
				117.8' - Fracture or mechanical break, 10 deg, smooth, undulating to stepped, tight to -	Ш	except voids up to 1/16" over 15-40% of surface increasing with depth,	
125			4	open 1/4"	Ш	trace fossil casts up to 1/16"x1/4"	Driller's Remark: Void at
-82. <del>6</del> _	R6-NQ			118.6,-118.7' - Bedding plane or mechanical break (2), horizontal, smooth to undulating,	Ы	_	124.7-125.8'
_	5 ft 50%	16	1	stepped, tight to open 1/8" 118.7-119.6' - Fracture zone (2), up to	Н	<sup>−</sup> No Recovery 125.9-128.4'	_
_				1-3/4"x2" sized fragments, many fractures at	H	-	_
_			NR	0 deg, a few at 70-80 deg 119.7' - Fracture, 80 deg, smooth, undulating,	H	_	-
_			'"`	tight -	Ħ	-	R6: 12 minutes
_	128.4			120.3' - Fracture, 40 deg and 45 deg, smooth, undulating, tight	H	-	-
-	120.4		_	120.8' - Fracture, 80 deg, rough, undulating, tight	H	Limestone	Water level at 1.9' below
-			7	120.9' - Mechanical break	Ш	_ 128.4-131.2' - pale yellowish brown, (10YR 6/2), fine to medium grained,	ground surface on 3/26/07 _ at 08:00
130			7	121.0-121.5' - Fracture zone (2), breaks at 80-90 deg, many discontinuities up to	Н	mild to moderate HCl reaction, medium strong (R3), voids up to	Water level 1.9' below - ground surface on 3/27/07
-87.6				1-3/4"x1-3/4" fragments 121.5' - Bedding plane, horizontal, smooth,	Н	3/16" over 10-20% of surface, trace	at 08:08
_	R7-NQ 5 ft	9	>10	undulating, open	Н	fossil casts up to 1/4" diameter	Driller's Remark: No circulation during run
	56%			121.8-121.9' - same as 121.5' except tight 121.85' - Fracture, 80 deg, rough, undulating,	H	No Recovery 131.2-133.4'	Driller's Remark: Light chatter from 128.4-132.4'
				open 123.4-123.7' - Fracture zone (2), three rock	囯	<u>-</u>	Driller's Remark: no
_			NR	fragments	Ш	<u>-</u>	chatter, faster drilling from 132.4-132.9'
_				123.9, 124.2, 124.45' - Fracture or mechanical break (3), horizontal and 10 deg.	Ш	-	R7: 12 minutes
-	133.4			rough, undulating, open	$\Box$	⁻ Limestone	Driller's Remark: Very soft
-			>10	break (2), Horizontal, Simooth, planal to	$oxed{\Box}$	133.4-134.25' - light olive gray, (5Y 5/2), very fine to fine grained, mild to	from 133.4-135.4', harder _
			>10	undulating, tight to 1/4" open 125.0' - Bedding plane or mechanical break,	A	moderate HCl reaction, medium	from 135.4-137.4', soft from 137.4-138.4'
135 <u> </u>				horizontal, smooth, planar to undulating, —	Ħ	strong (R3), voids (1/16") over <10% of surface, trace fossil casts up to	-
-	R8-NQ			open 125.4' - Fracture, 60 deg, planar to stepped,	Ħ	- 1/2"x1/4"	-
-	5 ft 28%	0		open 1/4"-1/2" 128.5' - Fracture, 40 deg, rough, undulating,	Ħ	_ 134.25-134.65' - dusky yellow, (5Y 6/4), medium to coarse grained,	-
-	-		NR	open	H	moderate HCl reaction, medium strong (R3), voids (3/16") over	1
_				128.8' - Fracture, 70 deg, rough, undulating, - tight to open 1/5"	Ш	15-30% of surface, 5-10% fossil	
_				128.85' - Fracture, 30 deg, rough, undulating, tight to open 1/8"	Ш	- casts up to 3/6"x1/2" 134.65-134.8' - Same as	R8: 8 minutes -
	138.4			agnitio open ino	Ш	133.4-134.25'	
1					1		



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

WATER	LEVELS: 1.7	ft bgs	s on 03	3/20/07 START : 3/14/2007 END : 4/	9/200	LOGGER : C. Wallestad				
≥O≎	(%)			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
-			3	129.05' - Fracture, 20 deg, smooth, undulating, tight 129.25' - Fracture, 10 deg, rough, undulating,		No Recovery 134.8-138.4' Limestone 138.4-139.2' - pale yellowish brown	-			
140 -97.6 - - - -	R9-NQ 5 ft 30%	0	4 NR	open 1/8"-1/4" 129.4' - Fracture, 85 deg, smooth, undulating, dark staining, open 129129.75' - Fracture (2), 70 deg, smooth, undulating, dark staining, tight 129.85' - 70 deg, smooth, undulating, tight 130.0' - Fracture, 20 deg, smooth, undulating, tight, dark staining 130.05' - Fracture, 35 deg, smooth, undulating, tight 130.3-130.35' - Fractures (2), 15 deg,		to medium dark gray, (10YR 6/2 to N4), dark mottling, very fine to fine grained, medium strong (R3), voids (1/16") over 5-20% of surface, dissolution cavities (1.5"x1/4") over 5% of surface, mineralization (pyrite) mottling associated w/cavities 139.2-139.9' - very fine grained, trace voids (1/16"), no visible cavities or fossils  No Recovery 139.9-143.4'	R9: 15 minutes Driller's Remark:			
-	143.4		2	smooth, undulating, tight 133.5' - Fracture, 70 deg, smooth, undulating, black staining, open 133.65' - Mechanical break, horizontal,	Ħ	Limestone 143.4-148.05' - light olive gray, (5Y	Continued circulation loss, potentially rock fragment jammed in core barrel shoe			
- 145_ -102.6			2	smooth, planar, tight, open 1/2" 133.8' - Fracture, 75 deg, smooth, undulating, _ tight to open 1/4"	Ħ	5/2), fine to medium grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), thin bedding, voids (1/16") over 5-40% of	and unable to capture rock core Driller's Remark: End drilling for the day at 143.4'			
- - -	R10-N0 5 ft 93%	65	1	134.05' - Mechanical break, horizontal, smooth, planar, open 134.25' - Fracture zone, up to 1"x1-1/2" fragments 134.5-134.65' - Fracture zone (2), up to 1"x1-1/2" fragments		surface (varies with bedding), trace fossil casts (1/4"x1/8") concentrated at 144.4-145.3', 5% dissolution cavities at 143.4-143.7' and 144.2-145.3'	on 3/27/07 at 18:00			
-	148.4		1 NR	138.4-138.7' - Fracture zone, up to 1"x2" fragments 138.95, 139.2, 139.5, 139.7, 139.8' - Mechanical break (5), horizontal and 10 deg,		- - No Recovery 148.05-148.4'	NQ bit Driller's Remark: Add <1 cup synthetic mud mix at			
150_			2	rough, undulating, tight to open 1/2" 139.65' - Fracture, 60 deg, smooth to rough, undulating, tight to open 1/4" 143.7' - Fracture, vertical and horizontal, rough, undulating to stepped, tight to open		Limestone  148.4-151.7' - yellowish gray to medium gray, (5Y 7/2 to N5), very fine to fine grained, mild HCl reaction, medium strong (R3), voids	145.0' - SC-2 collected at 144.5-			
-107 <u>.6</u> - - -	R11-NQ 5 ft 92%	58	3	1/5" 144.0, 144.5, 145.3, 145.4, 146.15' - Mechanical break (5), 0-5 deg, smooth, planar to undulating, tight to open 1/5" 147.3' - Fracture, 50 deg and horizontal,		(1/16") over 10-25% of surface, dissolution cavities up to 1"x3" following 60-70% angle fracture pattern	145.3' R10: 35 minutes Driller's Remark: 2nd gear with 500psi down pressure, then switched to 3rd gear			
- - -	153.4		10 >10 NR	smooth, undulating, tight to open 1/8" 147.85' - Fracture, 60 deg, smooth, undulating, open 147.9' - Fracture, 40 deg, smooth, planar,		151.7-153.0" - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild to moderate HCI reaction, weak to medium strong (R2 to R3), voids (3/16") over 20-40% of	at 300psi for R11-NQ in order to decrease run time at 14:35 - R11: 17 minutes			
- - - 155			>10	open 147.95-148.05' - Fracture zone (2), up to 1"x1-1/2" fragments 148.5' - Fracture, 55 deg, smooth, undulating, tight		surface, trace fossil casts up to 1/4"x1/8", dissolution cavities up to 1-1/2"x1" over 10-15% of surface  No Recovery 153.0-153.4' Limestone	- - -			
-112.6 - -	R12-NQ 5 ft 73%	22	2	150.2' - Mechanical break, horizontal, rough, — dark metallic staining, tight 150.8' - Fracture, 60 deg, smooth, undulating, tight 150.4' - Fracture, 50 deg, smooth, planar,		153.4-157.1' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 7/2), fine to medium grained, mild to moderate HCl reaction, medium strong (R3), voids (1/16") over 15-30% of surface	- - -			
- -			4 NR	heavy dark metallic staining, tight 151.35' - Fracture, 60 deg, smooth, undulating, dark metallic staining, open 151.5' - Mechanical break, 40 deg, rough, undulating to stepped, tight		voids (1716) over 15-30% of surface (increasing percentage with depth), poorly fossiliferous, trace casts to 1/4"x2", trace cavities up to 1/4"x2"  No Recovery 157.1-158.4'	-			
	158.4			undulating to stepped, tigrit						



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

WATER	LEVELS : 1.7	7 ft bas	s on 0	3/20/07 START : 3/14/2007 END : 4/9	9/ <u>2</u> 00	7 LOGGER : C. Wallestad		
				DISCONTINUITIES		LITHOLOGY	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) a D	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.	
160 -117.6 -	R13-NC 5 ft 98%	78	1 4 2	152.0' - Fractures, 80 deg, rough, undulating, dark metallic staining, intersecting, tight 152.1' - Fracture, 10 deg, smooth, undulating, open 1/4", lightly stained 152.25-153.0' - Fracture zone (2), up to 2"x2" fragments 153.4-153.55' - Fracture zone (2), up to 3/4"x1-1/4" fragments 153.7' - Fracture, 10 deg, smooth, undulating, light tan thin coating on surface, tight to open 1/4" 153.8' - Fracture, vertical, same as 153.7' 153.95-154.05' - Fracture zone (2), up to		Limestone  158.4-160.65' - light olive gray, (5Y 5/2), fine to coarse grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), laminated bedding, voids (3/16") over 10-40% of surface (variable), trace fossil casts up to 1/8" diameter, cavities over 5-10% up to 1/4"x1/8", trace infill of weak rock (R2) dusky yellow (5Y 6/4); 160.65-160.85' weak rock (R2) moderate yellowish brown, voids (1/16") over 20-25% of surface	Driller's Remark: Heavy chatter from 154.0-155.5', at 155.5' - cannot advance, removing casing to check bit, stop drilling on 3/28/07 at 16:10 at approximately 155'  Water level at 2.1' below ground surface on 3/29/07 at 08:20  Water level at 2.7' below	
- - -	163.4		2 (NR) 7	1/2"x1" fragments 154.25' - Fracture, same as 153.7' 154.35' - Fracture, 30 deg, smooth, undulating, tight to open 1/4"		160.65-160.85' - moderate yellowish brown, (10YR 5/4), weak (R2), voids - (1/16") over 15-25% of surface 160.85-163.3' - moderate yellowish	ground surface on 4/3/07 at 09:10 – Water level at 2.8' below	
-165 -122.6 - - - -	R14-NC 5 ft 97%	18	7 7	deg, rough, undulating, open 155.15-155.4' - Fracture zone (2), fragments up to 3/4"x1-1/2" 155.4' - Fracture, 75 deg, rough, undulating, dark staining 156.05-156.2' - Fractures (2), 70 deg and 55 deg, rough, undulating, tight to open 1/8"		15-25% of surface, trace cavities (1/16"-1/2"), trace fossils (1/8"-1/4")  No Recovery 163.3-163.4'  Limestone 163.4-168.25' - grayish orange, (10YR 7/4), fine to coarse grained, mild to moderate HCl reaction, laminated bedding, alternating beds up to 1" thick, mottled with light olive  162.		ground surface on 4/4/07 at 08:20 - Water level at 7.6' below ground surface on 4/5/07 - at 08:10, inside core barrel casing R 12: 25 minutes - SC-3 collected at 161.35- 162.4' -
_	168.4		4 NR	156.6' - Fracture or mechanical break, vertical, rough, undulating, tight 156.65, 156.7, 156.8, 156.9' - Bedding plane or mechanical break (4), smooth, horizontal		<ul> <li>gray (5Y 5/2), contains grayish orange beds that are weak rock (R2)</li> <li>and coarse grained, voids (3/16")</li> <li>over 10-40% of surface; light olive</li> </ul>	R13: 17 minutes – R14: 16 minutes –	
- 170 -127.6 - -	R15-NC 5 ft 98%	58	1 4	to 10 deg, planar to undulating, tight 156.9-157.1' - Fracture zone (2), up to 1/2"x1-1/2" fragments 158.4-158.55' - Fracture zone (2), up to 1"x2" fragments 158.55' - Fracture, 40 deg, rough, undulating, open 159.8-160.0' - Fractures (2), 30 deg, rough, undulating, tight 160.2' - 70 deg, same as 159.65'		beds are medium strong rock (R3), fine grained, voids (1/16") over 5-15% of surface, fossil casts up to 1/4"x1/8" over 5-10% of surface from 167.0-168.25' No Recovery 168.25-168.4' Limestone 168.4-173.35' - pale yellowish brown, (10YR 6/2), fine to medium grained, mild to moderate HCI reaction.	- - - - -	
- - -	173.4		5 4 (NR)	160.2 - 70 deg, same as 199.65 160.65' - Fracture or bedding plane, horizontal, smooth, planar, tight 161.35-162.4' - Fractures (2), 20 deg, rough, undulating, tight 163.05' - Fracture, 20 deg, smooth,		mild to moderate HCT reaction, medium strong (R3), voids (1/16") over 15-25% of surface, void size increasing up to 3/16" with depth, trace dissolution cavities (up to 1-1/2"x1/8"), trace organic	R15: 17 minutes -	
175 -132.6 -	R16-NC 5 ft 73%	0	>10 >10 >10 >10	undulating, tight 163.65, 163.9, 164.0, 165.2, 165.05, 165.35, 165.45, 165.5, 165.55, 166.05, 166.45, 166.6, 166.9, 167.25' - Mechanical break (14).		laminations  No Recovery 173.35-173.4' Limestone  173.4-177.1' - pale yellowish brown,  (10YR 6/2), fine to medium grained, mild to moderate HCl reaction, medium strong (R3), voids (3/16")  over 15-25% of surface, trace cavities up to 1-1/2"x1/16", trace fossil casts up to 1/8"x1/16", trace laminations	- - - - -	
	178.4		NR	undulating, intersecting fractures, tight 167.1-167.15' - Fractures (2), 40 deg and 70 deg, rough, undulating, tight		No Recovery 177.1-178.4'	R16: 17 minutes -	



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SHEET 10 OF 12

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

WATER	LEVELS : 1.7	ft bgs	s on 03	3/20/07 START : 3/14/2007 END : 4/	9/200	7 LOGGER : C. Wallestad	
≥ 0 ∷	6)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE	E RU STH, OVEF	(%) Q	FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR!	SOR	ROI	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMI	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				167.6-167.7' - Fractures (2), 40 deg and 70	Ħ	Limestone	-
_			>10	deg, rough, undulating, intersecting, tight 167.85-167.95' - Fractures (2), 30 deg and 70	╁	178.4-182.1' - Same as 173.4-177.1' except trace cavities up to	-
100				deg, rough, undulating, intersecting, tight	H	1-1/2"x1/4", dark discoloration	-
180 -137.6			8	168.55' - Fracture, 10 deg, rough, undulating, _ tight	F	associated with cavities	
_	R17-NQ			169.05' - Fracture, 50 deg, rough, undulating, tight	Ħ	-	1
-	5 ft 73%	22	0	169.7' - Fracture, 60 deg, smooth, undulating	Ħ	<u></u>	1
_			5	to stepped, tight 170.15' - Fracture or mechanical break, 5	Ħ	-	1
				deg, smooth, stepped, open 1/8", dark	H	No Recovery 182.1-183.4'	1 1
			NR	staining 170.55' - Fracture, 55 deg, rough, undulating,	H		R17: 15 minutes
	183.4			open 1/8"-3/4" 170.8' - Fracture zone, 3/4"x1-1/2" fragments	₽	- 1:	
_	]		2	171.2' - Fracture, 20 deg, rough, undulating,	₽	Limestone 183.4-188.4' - dark yellowish brown	]
_				tight 171.35, 171.5, 171.8, 172.0, 172.45, 173.2' -	H	to pale yellowish brown, (10YR 4/6 to 10YR 6/2), fine to coarse grained,	
185 <u>-</u> -142.6			2	Bedding plane or mechanical break, horizontal, smooth, undulating, tight to open	Þ	mild to moderate HCl reaction,	_
-142.0	R18-NQ			1/8"	扛	medium strong (R3), abrupt color change at 184.45', voids (1/16" to	
-	5 ft 100%	77	5	172.1' - Fracture, 60 deg, rough, undulating, tight	士	_ 3/16") over 5-30% of surface, moderately fossiliferous, fossil casts	-
_	10070			172.4' - same as 172.1' except 30 deg	士	up to 1"x1/2" over 5-10% of surface	SC-4 collected at 186.25- 187.05'
_			4	173.25' - same as 172.1' except vertical 173.4-174.4' - Fracture zone (2),	+	(percent increases with depth), trace cavities up to 1-1/4"x1/4"	-
-				1-1/2"x2-1/2" fragments 175.2' - Fracture, 20 deg, smooth, undulating,	H	- '	R18: 18 minutes
_	188.4		1 t	tight to open 1/4"	F	=	1
_			4	175.6' - Fracture zone, 1"x1/2" fragments 175.9' - Fracture, 30 deg, rough, undulating,	Ħ	Limestone 188.4-193.25' - light olive gray to	Driller's Remark: Hard material, about 2" thick at
				tight 176.0-176.1' - Fracture zone (2), fragments	Ħ	moderate yellowish brown, (5Y 5/2 to	189.6'
190			3	up to 1"x1/2"	片	10YR 5/4), fine to coarse grained, _ mild to moderate HCl reaction, weak	Driller's Remark: Hard
-147.6	D40 NO		_	176.3' - Fracture, 70 deg, rough, undulating, tight to open 1/4"	片	to medium strong (R2 to R3), voids up to 3/16" over 30% of surface,	material, about 2" thick
_	R19-NQ 5 ft	67	3	176.4' - Fracture, horizontal, rough, undulating, tight	H	_ moderately fossiliferous from	]
_	97%			176.5' - Mechanical break, horizontal,	H	188.4-190.1', poorly fossiliferous from 190.1-191.9', casts up to	
_			3	smooth, planar, tight 176.6-177.1' - Fracture zone (2), up to	╀	1/2"x1/4", trace laminations, fine	-
-				1-1/2"x1-1/2" fragments 178.4-179.3' - Fracture zone (2), up to		grained infill over 20-40%, trace cavities up to 1-1/2"x1/8", short	-
-	193.4		2	1/2"x1-3/4" fragments	$\blacksquare$	(1/4"x1/2") stacked 60 deg fractures from 188.95-189.0' (micro structural	-
-	100.7		NR)	179.3' - Fracture, 40 deg, smooth, undulating, open	厈	– feature)	R19: 14 minutes
-			7	179.55' - Fractures (2), 20 deg and 10 deg, rough, undulating, open, intersecting	世	No Recovery 193.25-193.4' Limestone	-
195			5	179.75' - Fracture, 50 deg, rough, undulating,	口	- 193.4-193.75' - Same as 188.4-191.9'	
-152.6			່ວ	tight — 179.85' - Fracture, 40 deg, rough, undulating,	世		-
	R20-NQ 5 ft	26	4	open 180.0' - Fracture, 20 deg, smooth, undulating	$^{\perp}$		1
	98%	_5		to stepped, tight, dark staining	Ы		1
			2	180.15 - Fracture, 10 deg, rough, undulating, open	F	_	]
_				180.33- 180.37' - Fractures (2), <10 deg,	F	_	]
_			6	smooth, undulating, tight to open 1/2" 181.45' - Bedding plane, horizontal, smooth,	片	-	_
	198.4			planar, dark staining, tight	⊭		
					•		•



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

WATER	LEVELS: 1.7	ft bgs	s on 03	3/20/07 START : 3/14/2007 END : 4/	9/200	LOGGER : C. Wallestad			
≳O≨	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
H B ATIC	E R.L. STH, OVEI	(%) O	FOG	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD		
SURI	SOR	ROI	-RA(	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.		
		_	NR)	181.65' - Fracture, 70 deg, smooth, planar to		193.75-198.3' - yellowish gray to	R20: 14 minutes -		
-			3	undulating, tight 181.7' - Bedding plane, horizontal, smooth,	+	_ moderate yellowish brown, (5Y 7/2 to	End drilling on 4/5/07 at		
-				planar to stepped, open	H	mild to moderate HCl reaction, very Water le weak to medium strong (R1 to R3), ground s	18:00 at 198.4' Water level at 3.3' below		
200 -157.6			2	181.8' - Mechanical break, hardness test	H		ground surface on 4/6/07 at 07:56		
-	R21-NQ			tight	Ш	voids up to 3/16" over 5-25% of surface increasing percentage with	Begin coring at 08:00		
-	5 ft 63%	11	>10	184.05, 184.2, 184.5, 185.6, 185.65, 185.7, 185.85, 186.25, 188.05' - Fractures or	ш	depth, trace fossil casts up to 1/4"x1/8", 196.4-197.7' has moderate	Driller's Remark: Slow,		
-	03%		<10,	bedding plane (9), 5 deg, smooth, undulating,	ш	coverage (15-10%) of cavities up to	hard coring from 201.0-		
-				tight 185.7-185.85' - Fracture zone (2), up to	Ш	_ 1"x1/2", grain size coarsens with depth	201.5', rock core fragment was jammed inside shoe of		
-			NR	1-1/2"x2/3" fragments	╁┼┤	− No Recovery 198.3-198.4'	core barrel –		
-				187.05, 187.2, 187.35' - Fractures (3), 10 deg	H	Limestone	R21: 26 minutes		
-	203.4			and 20 deg, rough, undulating, tight 187.25' - Fracture, vertical, rough, undulating,	H	198.4-199.9' - moderate yellowish - brown, (10YR 5/4), medium grained,	R22: 15 minutes		
-				tight 188.4' - Fracture, 45 deg, rough, undulating,	出	mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids	-		
-				tight	Н	- up to 3/16" over 15-20% of surface,	-		
205 <u> </u>				188.5, 189.1, 189.2, 189.3, 189.55' - Bedding _ plane (5), horizontal, smooth, planar, open to	Щ	trace cavities up to 1/4" diameter, trace fossil casts up to 1/4"x1/3"			
-102.0	R22-NQ			tight	ш	- 199.9-201.55' - grayish orange,	-		
-	5 ft	0	NR	189.1-189.2' - Fracture zone (2), 1"x1-1/4" fragments	╁╥	(10YR 7/4), mild HCl reaction, medium strong (R3), trace voids up	-		
-	0%			189.5' - Fracture, horizontal, smooth, planar	F	– to 1/16"	1		
				190.05' - Fracture, 10 deg, rough, undulating, tight		No Recovery 201.55-218.25'	_		
				191.05-191.2' - Fractures (2), 30 deg and 60	Ш	_	_		
_				deg, smooth, undulating, intersecting, tight 191.3' - horizontal, same as 190.05'	Н	=	Driller's Remark: 1.2' slough at bottom of boring		
	208.4			191.55' - Fracture, 65 deg, rough, undulating,	Ш	=			
				tight 192.3' - same as 190.05'	Ш	_	-		
				192.95-193.15' - Fractures (2), 40 deg and 25	Ш	_	1		
210				deg, smooth, undulating, intersecting, tight 193.75-193.85' - Fractures (2), smooth,	₽	_			
-167.6	R23-NQ			planar, tight	H	_	_		
	5 ft	0	NR	193.8' - Fracture, 75 deg, smooth, planar, tight	ш	=	_		
4	0%			193.95, 194.1, 194.6' - Fractures (3), 30 deg	₽	<del>-</del>			
4				and 60 deg, rough, undulating, tight 194.3' - 50 deg, same as 194.1'	Ш	<del>-</del>			
				194.85' - vertical, same as 194.1'	Щ	<u>-</u>	R23: 15 minutes		
				195.0-195.2' - Fracture zone (2), up to 2"x1" fragments	Ш	-			
	213.4			195.45, 195.65, 195.85' - Fractures (3), 60	$\mathbb{H}$	-	]		
				deg, rough to smooth, undulating, tight 196.3, 196.5, 196.9' - Fractures (3), 10 deg	Ħ	<u>-</u>	_		
				and 20 deg, rough, undulating, tight	H	<u>-</u>	_		
215				197.4-197.55' - Fracture zone (2), up to 1"x3/4" fragments —	Ш	_	_		
-172 <u>.6</u>	R24-NQ			197.75' - Fracture, 70 deg, same as 195.45'	Н	=	]		
	5 ft	0	NR	198.0' - <10 deg, same as 195.45' 198.3' - 70 deg, same as 195.45', open	Щ	_	]		
	3%			198.6' - Fracture, 10 deg, rough, undulating,	Ш	_	]		
				tight to open 1/4" 199.35-199.55' - Fractures (2), 40 deg,	Н	_	]		
				smooth, undulating, tight	H	_	]		
				199.85' - 60 deg, same as 198.85' 199.95-201.55' - Fracture zone (2), up to	H	_			
	218.4			1-3/4"x3" fragments	H				
ldot							l		



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722999.7 N, 457929.8 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: R. Woodard

				200007 CTART 0// / 2000 TART 0			ONLIVIATION: Ventical
WATER	LEVELS: 1.7	tt bgs	s on 03		9/2007		COMMENTO
ĕ₽€	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	90	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	N. AN[ ≺Y (		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	: RU iTH, over	Q D (%)	Ţ.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT URF LEV	ORE	Ø	ZAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	022	œ		THICKNESS, SURFACE STAINING, AND HIGHTNESS	Ś	CHARACTERISTICS	
			_0_/	_	Н	Limestone 218.25-218.4' - pale yellowish brown,	R24: 12 minutes Driller's Remark:
_				-		(10YR 6/2), fine to medium grained,	Circulation almost
220				-	Н	moderate HCl reaction, medium	returned, hard coming up
-177.6				_		strong (R3), trace voids up to 1/16" over 5-10% of surface	casing; harder rock at bottom of run
-	R25-NQ			-		No Recovery 218.4-223.4'	-
-	5 ft	0	NR	-	Ш	_	_
_	0%			-		-	_
_				_	Н	_	_
				_		_	D05: 40 minutes
1					Н		R25: 18 minutes
1 7	223.4				Ш		
1 -						Bottom of Boring at 223.4 ft bgs on	Driller's Remark: Switched
-				-	1 1	_ 4/9/2007	to split spoon to attempt to _ recover a sample
-				-		-	Stop coring for day on
-					ll	_	4/6/07 at 13:45
_				-		_	Water level at 2.4' below
_				-		_	ground surface on 4/7/07
_				_		_	at 07:50
							End of boring at 223.4'.
							Driller's Remark: Hole
_				-		7	terminated short of 250.0' total depth due to borehole
-				-	1	-	collapse from 174.0-223.0'
-				-	1	-	and ground collapse -
_				-		_	around the surface casing and under the drill rig
_				-	1	_	and drider the drining
_						_	
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**SOIL BORING LOG** 

SHEET 1 OF 6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.6 N, 457934.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-15/16 tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 3.6 ft bo	s on 6/13	3/07	START : 6/12/2007 END : 6/13/2007 LC	OGGER	: D.	Whitaker
300				STANDARD	SOIL DESCRIPTION		စ္ခ	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME TIGOS COOLID OVAROUT COLLOD		SYMBOLIC LOG	DEDTU OF CACING DRIVING DATE
H H H		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		OLIG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EV-FIE			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		YME	INSTRUMENTATION
<u> </u>	0.0			(N)	Silty Sand With Organics (SM)		S	11:30 - Start sampling using AWJ rods, 2'x2"
-	0.0		00.4	2-2-3	$\sim$ 0.0-0.55' - brownish black, ( $5YR$ 2/1), moist, loose,	, ,=		split spoon, drilling with 2-15/16" tri-cone bit –
-		1.3	SS-1	(5)	bark and root matter present, sand is light gray (N7) fine grained, silica, 22% fines	<sup>7),</sup> / -		Wet at 1'
-	1.5				Poorly Graded Sand (SP)	—∕ [-]	OF IOLE	- VVEC at 1
-					0.55-1.3' - pale yellowish brown to moderate yellow brown, (10YR 6/2 to 10YR 5/4), moist to wet, loose	vish   -		-
-					very fine to fine grained, trace non-plastic fines, 10	, i%   -		-
-					roots and organics			_
-						-		=
-						-		=
-						-		_
5 37.2	5.0				Poorly Graded Sand (SP)			_
- 31.2			0.5	1-1-0	5.0-6.1' - yellowish gray, (5Y 7/2), wet, very loose,	-		-
-		1.1	SS-2	(1)	very fine to fine grained, medium plasticity, 4% nonplastic fines, sand is silica	7=		=
-	6.5				Tioriplastic lines, sand is silica	/ -		_
-						_		_
-						-		-
-						-		_
-						_		_
-						-		_
-						-		=
10 <u> </u>	10.0				Clayey Sand (SC)		////	_
52.2				0-0-1	10.0-10.25' - light bluish gray. (5B 7/1), wet, very	-		=
-		0.3	SS-3	(1)	loose, no HCl reaction, 33% high plasticity fines, fir to coarse sand and fine gravel-sized limestone	ne _		-
-	11.5				$\neg$ fragments that are yellowish gray (5Y 7/2) with stro	ng /		-
-					\HCI reaction	/ -		
-						-		12'
-						-		-
-						-		-
-						-		-
-						-		-
15 <u> </u>	15.0	0.3	SS 1	50/5	Silt (ML)		Ш	 14:40 - 15' of HW casing installed
	15.4	0.3	SS-4	(50/5")	↑ 15.0-15.33' - very pale orange to grayish orange,	. 1	Ш	To or thir odding installed
-					(10YR 8/2 to 10YR 7/4), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 3% fine	d /-		-
-					sand, trace organics, all carbonate material			-
-						-		
-						-		casing and borehole to prevent caving –
-						-		-
-						-		-
-						-		-
						-		-
20								



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-14A

SHEET 2 OF 6

### **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.6 N, 457934.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-15/16 tri-cone bit ORIENTATION: Vertical

						y, auto nammer, Avvj rous,			ORIENTATION : VEItical
WATER	LEVELS	: 3.6 ft bo	49 011 0/T		START : 6/12/2007	END : 6/13/2007 SOIL DESCRIPTION	LUGGE	<u>π.υ</u>	. Whitaker  COMMENTS
<b>≥</b> 9€	CAMPIT	INTERVA	1 (#)	STANDARD PENETRATION		JOIL DECOMM HON		8	GOMMENTO
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE		. ,	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR			SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H B		RECOVE	<u> </u>		MOISTURE	CONTENT, RELATIVE DE	NSITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
SUR!			#TYPE	6"-6"-6" (N)	CONSISTENC	CY, SOIL STRUCTURE, MII	NERALOGY	SYM	INSTRUMENTATION
22.2	20.0			(**)	Silt With Sand	(ML)		T	
-		1.0	SS-5	10-16-13	20.0-21.0' - gray	yish orange, (10YR 7/4),	wet, very stiff,	111	-
-		1.0		(29)		d dilatancy, moderate HC o medium grained sand, o		₩	4
-	21.5				to fine gravel-size	zed lenses at 20.0-20.5',	all carbonate /	1	-
-					\material			┨	-
-								1	-
_								┨	-
-								-	-
_								4	-
_								4	_
25	25.0		00.0	50/4.5	Oile Mile O	(841.)		╂	4 -
17.2	25.4	0.4	SS-6	50/4.5 (50/4.5")	Silt With Sand (	(ML) vish orange to dark vellov	vish orange.	╨	4
_				(55:115)	\ (10YR 7/4 to 10	ÝR 6/6), moist, hard, nor	plastic, rapid	1	_
_					\dilatancy, mode \sized, all carbor	erate HCl reaction, 15% fi	ne sand	1	
_					(=====			1	_
								]	_
									_
								1	
-								1	1
30	30.0							1	1
12.2					Sandy Silt (ML)			Ш	1
-		0.6	SS-7	14-5-9		yish orange to dark yellow YR 6/6), wet, stiff, nonpla		₩	4
-	31.5			(14)	dilatancy, mode	erate HCl reaction, 40% fi	ne to coarse	1	1
-	01.0				sand sized, 10%	% fine gravel-sized grains	, all	1	1
-					Carbonate			1	-
-								1	-
-								1	-
-								1	-
-								1	16:10 - Recover SS-8, decide to start rock
-								1	coring; add 20' HW casing to 34' (1' stickup)
35 7.2	35.0 35.3	0.3	SS-8	50/3.5	Silt And I impet	tone Fragments (ML)		$\frac{1}{1}$	SS-8 may be slough/cuttings
'		\	00-0	(50/3.5")	35.0-35.3' - gray	yish orange to pale yellow	vish brown,	-	Borehole drilled from 35.3-36.0' without
-					(10YR 7/4 to 10	OYR 6/2), wet, moderate to of sample is silt (similar to	o strong HCl	4	sampling to set stroke
-					of sample is lim	nestone fragments up to 1		-	-
-					carbonate mate			-	
_					Begin Rock Cor	ring at 36.0 ft bgs neet for the rock core log		1	
-								1	
-								1	_
_								1	_
								1	
40							_		



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.6 N, 457934.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER LEVELS : 3.6 ft bgs on 6/1				13/07 START : 6/12/2007 END : 6/	3/200	7 LOGGER : D. Whitaker				
≥ D ₽				DISCONTINUITIES	ပ္က	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
_	36.0		1	- 36.7' - Mechanical break or bedding plane,		Limestone  - 36.0-41.0' - light olive gray, (5Y 7/2), fine grained, moderate HCl reaction,	Water level at 3.6' below ground surface on 6/13/07 - at 07:30			
-			1	10 deg, rough, undulating, tight to 1/4" open		weak (R2), 25% voids up to 1/16" increasing to 40% at 37.5', many oblong cavities (3/16" to 9/16") with	Begin rock coring at 36' below ground surface 07:55 on 6/13/07			
-	R1-NQ 5 ft 100%	91	2	37.9' - Mechanical break or bedding plane, 10 deg, smooth to rough, undulating, tight 38.55, 38.9' - Mechanical break or fractures (2), 25 deg and 45 deg, rough, undulating,		trace recrystallization on inner surfaces, trace infill	SC-1 collected at 36.7- 37.85'			
40 2.2			0	tight		- <del>-</del>	R1: 11 minutes			
-	41.0					0	- -		- 41.0-43.8' - Same as 36.0-41.0'	
-			0	- -		except very weak (R1) at 42.6-43.8'	- -			
-	R2-NQ		2	42.6, 42.9, 43.7, 43.9, 44.7, 44.95, 45.3, 45.6' - Mechanical break (8), 5-15 deg, smooth to		-	-			
-	5 ft 96%	84	1	rough, undulating, tight -		- - 43.8-45.8' - light olive gray, (5Y 7/2), fine to medium grained, extremely	- -			
45 -2.8			0			weak (R0), 60% voids up to 1/16" — with some silt-sized infill and minor recrystallization, few black 1/16"	R2: 6 minutes			
-	46.0		NR 2	46.1, 46.5, 47.6, 47.8, 48.8, 49.15, 49.6, 49.9' - Bedding plane or mechanical break (8), <15	Ħ	diameter fossils, thin laminations of organic material from 45.65-45.8'  No Recovery 45.8-46.0'  Limestone	-			
-			2	deg, smooth, undulating, tight to 1/4" open		46.0-47.3 - moderate yellowish brown, (10YR 5/4), fine to medium grained, strong HCl reaction, very	Additional mechanical breaks created when placing core into box, due			
-	R3-NQ 5 ft 80%	53	2	- -		<ul> <li>weak (R1), up to 1/16" voids over 40% of surface, trace black fragments at 46.1', some silt-sized infill, some recrystallization in void</li> </ul>	to rock conditions			
50			3	- -		space, many (>5) black organic fragments up to 3/16" diameter 47.3-50.0' - Same as 46.0-47.3'				
-7.8 -	51.0		NR	- 		except extremely weak (R0), with trace black fragments at 48.8' No Recovery 50.0-51.0' Limestone	R3: 5 minutes -			
-			5	51.15, 51.4' - Fractures or mechanical break (2), 30 deg, smooth, planar to undulating, tight to 1/2" open 51.75, 51.82' - Bedding plane (2), <10 deg,		51.0-53.35' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate HCl reaction,	-			
-	R4-NQ		>10	smooth, undulating 51.75-51.82' - Fracture, 85 deg, smooth, planar, extends between 2 bedding plane		extremely weak (R0), 5-15% voids <1/16" on surface, trace 1/32" to 1/16" black laminations, many 1/16"	- -			
-	5 ft 47%	0		fractures 52.0-52.3' - Fracture zone 53.0, 53.15' - Bedding plane or mechanical		black organic particles No Recovery 53.35-56.0'				
55_ -12.8			NR	break (2), 5 deg, rough, undulating —			R4: 2 minutes			
	56.0				H					
					ш		I			



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.6 N, 457934.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER LEVELS : 3.6 ft bgs on 6/13/0				13/07 START : 6/12/2007 END : 6/	13/20	D7 LOGGER : D. Whitaker	
≥∩≘	- (9	§		DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - - - - - - - - - - - - - - - -	R5-NQ 5 ft 0%	0	NR			No Recovery 56.0-61.0'	Driller's Remark: All sand/silt-sized particles fell out/washed out of core barrel during retrieval  Driller's Remark: Fragments/pieces of rock could be felt at 59.0' R5: 2 minutes
- - - - - - 65_ -22.8	R6-NQ 5 ft 31%	0	>10 2 NR	61.0-61.2' - Fracture zone, 2 subrounded gravel sized fragments 61.4' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight 61.65' - Bedding plane, horizontal, rough, planar, black staining on surface, <1/2" open 61.9' - Bedding plane or mechanical break, <10 deg, rough, undulating, tight 62.05' - Fracture or mechanical break, 25 deg, smooth, undulating, tight 62.35' - Fracture or mechanical break, 10 deg, smooth, undulating, tight to 1" open		Limestone 61.0-62.55' - dusky yellow, (5Y 6/4), fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), 40% surface voids up to 1/16", trace very thin (<1/32") black laminations at 61.25-61.3', oblong black material up to 1-3/16" x 1/16", spherical black material at 3/8" diameter, many cavities up to 3/8"x 3/16" No Recovery 62.55-66.0'	
	R7-NQ 5 ft 75%	14	3 >10 >10 2 NR	66.1' - Bedding plane, horizontal, rough, stepped, up to 1" open 67.05-67.55' - Fracture zone 67.7, 69.1' - Fracture (2), 75 deg, rough, undulating to stepped, tight to <1/2" open 67.9, 68.05' - Bedding plane or mechanical break (2), <10 deg, smooth, undulating 68.25, 68.45, 68.6' - Bedding plane or mechanical break (3), <15 deg 68.7' - Fracture, 45 deg, rough, stepped, tight69.34-69.5' - Fracture zone		Limestone  66.0-69.75' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate HCl reaction,  weak (R2), 30% surface voids <1/16" diameter many cavities up to 3/8"x3/16", minor recrystallization, trace black laminations up to 3/16" thick, trace black organic material up to 5/16" diameter moderately fossiliferous (molds, casts)  No Recovery 69.75-71.0'	09:50 Driller's Remark: Hole started caving due to loose interval at 56.0-61.0', installed HW casing from 35.0-60.0'  11:20 Casing installed, borehole flushed  R7: 5 minutes
	R8-NQ 5 ft 62% 76.0	22	1 3 3 0 NR	71.8' - Bedding plane, 10 deg, rough, stepped 72.1' - Bedding plane, horizontal, rough, stepped 72.6, 72.9, 73.65, 73.9' - Mechanical break or bedding plane (4), <15 deg, smooth, planar to undulating, tight 73.2' - Fracture, 40 deg, tight		Limestone 71.0-72.15' - Same as 66.0-69.75' except very weak (R1), 40% surface voids <1/16" 72.15-74.1' - Same as 66.0-69.75' except extremely weak (R0), 5% surface voids <1/16"  No Recovery 74.1-76.0'	



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.6 N, 457934.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

				HENT . CIVIE 33 3/N 3 10023, HIND TOTALLY, INQ TOOLS, HWY C			ORIENTATION: Vertical
WATER	LEVELS : 3.6	ft bg	s on 6		13/200		,
≥∩₽	(9)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OLZE AND DEDTIL OF GARING
出병은	Z, H	(%) Q	R P	DEDTIL TYPE OBJECTATION BOLIOUNESS		MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F X X	SGE SOV	) Q	PF	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	ABC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
		a	쥬	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	014				9,	Limestone	
_			1			- 76.0-80.0' - moderate yellowish	
				76.55' - Mechanical break		brown, (10YR 5/4), fine to medium	
I -				76.9-77.05, 77.25-77.43' - Fracture zone,	Н	grained, moderate HCl reaction,	1
-			2	sand to gravel-sized limestone fragments		extremely weak to very weak (R0 to	1
-	50.110				$\bot$	R1), 50% surface voids <1/16", many (5+) cavities, few large cavities up to	
I _	R9-NQ 5 ft	0	>10	78.05' - Bedding plane, 5 deg, rough,	$\Box$	- 1-3/16"x5/16", minor silt-sized infill,	
	80%		10	stepped, up to 1/4" open 78.15' - Bedding plane, horizontal, rough,		minor recrystallization, trace black	
_				stepped, up to 3/4" open	ш	fossil casts, poorly fossiliferous, zone	Driller's Remark: Slight
-			1	78.25-78.5, 78.7-78.8' - Fracture zone	$+ \pi$	from 77.95-78.75' is weak rock (R2),	mud loss at 80.0'
80				79.65' - Mechanical break, <15 deg, rough,		5% surface coverage of voids <1/16"	l
-37.8			NR	stepped	Ш	with minor recrystallization  No Recovery 80.0-81.0'	R9: 5 minutes
	81.0		INE		$\Box$	= No Recovery 00.0-01.0	1
I -	01.0			81.1' - Fracture, horizontal, smooth, planar,	$\Box$	_ Limestone	1 1
-			>10	black organic infill or staining	╀┦	<ul> <li>81.0-81.4' - very pale orange, (10YR)</li> </ul>	-
I -				81.3-81.75' - Fracture zone, angular rock		_ 8/2), fine grained, very weak (R1),	]
				fragments	$\vdash$	laminated bedding, 3/4" black - organic laver at 81.0'	
-			3	81.7' - Fractures (2), 60 deg and 45 deg,	1-	81.4-82.9' - pale olive, (10Y 6/2),	1
-	R10-NC			smooth, stepped, intersecting, tight 81.85' - Fracture, vertical, rough, undulating,	ш	weak to medium strong (R2 to R3),	1
_	5 ft	34	>10	1/8" open	+	<ul> <li>20-25% coverage of surface voids up</li> </ul>	-
<u> </u>	84%			82.5, 82.65, 83.4, 83.55' - Fracture (4), 50		to 1/16", fossiliferous	]
			_	deg, rough, undulating to stepped, tight to		82.9-83.6' - grayish orange, (10YR 7/4), fine grained, moderate to strong	
85			0	1/4" open	$\vdash$	HCl reaction, very weak (R1)	1 1
-42.8			1	83.0-83.2, 83.76-83.95' - Fracture zone 84.1' - Fracture, 45 deg, rough, stepped		83.6-85.2' - yellowish gray, (5Y 7/2),	R10: 5 minutes
			NR	64.1 - Fracture, 45 deg, rough, stepped	ш	medium strong (R3), 20-25% voids	-
l _	86.0		INIT		Н	up to 1/16" over surface, 1-2% fossil	
						molds up to 5/16"	1
-			3	86.4-86.6' - Fracture zone, bound by 45 deg	╁┼	No Recovery 85.2-86.0' Limestone	1
-				fractures, rough, undulating	$+ \top$	86.0-89.0' - yellowish gray, (5Y 7/2),	SC-2 collected at 87.3-
l -			1	87.1' - Fracture, 75 deg, smooth, undulating 87.3' - Bedding plane, horizontal, rough,		<ul> <li>fine grained, mild to moderate HCl</li> </ul>	88.35' -
				undulating, bedding plan splits into 45 deg	Н	reaction, medium strong (R3),	
	R11-NC			fractures above and below		15-20% surface coverage of voids up to 1/8", <2% surface coverage of	1
-	5 ft	40	1	88.4' - Mechanical break, smooth, stepped,	╁	cavities/molds up to 3/8" (1"x2" cavity	1
-	60%		$\vdash$	tight .	╀┤	at 88.9'), sparse soft white infilling in	1 -
-					Ш	some of the larger molds	1
90			ND		$\vdash$	No Recovery 89.0-91.0'	
-47.8			NR		Ш		R11: 9 minutes
-	04.0				Ш	_	1
-	91.0				+	Limostono	1 -
_			3	91.1, 91.4' - Bedding plane (2), <10 deg,		- 91.0-91.7' - Same as 86.0-89.0'	]
				smooth, undulating 91.5' - Fracture, 45 deg, smooth, undulating	$\vdash \vdash$	91.7-95.1' - moderate yellowish	
_				91.88, 92.2, 92.6' - Bedding plane or	$\Box$	brown, (10YR 5/4), fine to medium	Driller's Remark: Slight
-			2	mechanical break (3), <5 deg, rough,	$\Box$	grained, strong HCl reaction,	mud loss at 92.0', lost -
-	D40 N0	ļ	-	undulating to stepped, tight except 1/4" open	₽	extremely weak (R0), 5-10% surface	circulation completely at 93.0'
I _	R12-NG 5 ft	7	>10	at 92.2'	$\Box$	coverage of voids <1/16", trace black oblong material up to 3/8"x1/16",	33.0
	82%	l ′	10	92.9' - Mechanical break, horizontal, smooth, undulating, tight		minor recrystallization	
I -				93.0-93.33' - Fracture zone	111	_	1 1
			2	93.33' - Fracture, 60 deg, rough, stepped	口	_	1 +
95 <u> </u>			1	93.5' - Fracture, 45 deg, smooth, stepped,	+		B13: 7 minutes
-52.6			L1 NR	black staining, tight 93.8, 93.95, 94.2' - Fractures (3), 45-60 deg,		No Recovery 95.1-96.0'	R12: 7 minutes
	96.0		INE	rough, planar to stepped			
							1



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.6 N, 457934.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS: 3.6	ft bgs	s on 6/	13/07 START : 6/12/2007 END : 6/	13/20	07 LOGGER : D. Whitaker	
30₽	(%			DISCONTINUITIES	၂	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - -	0	_	5 >10	94.5, 94.8, 95.0' - Bedding plane (3), <10 deg, rough, undulating, black staining at 94.5', tight to 1/4" open 96.1' - Bedding plane, horizontal, smooth, undulating 96.4' - Fracture, 55 deg, smooth, undulating,		Limestone 96.0-97.8' - light olive gray grading to yellowish gray, (5Y 5/2 to 5Y 7/2), fossiliferous (molds/casts), voids up to 1/16" over 10-15% of surface, 1-2% coverage of molds/casts up to	- - -
-	R13-NQ 5 ft 86%	18	>10 6	tight 96.7-96.95' - Fracture zone 97.5' - Fracture or mechanical break, 40 deg, rough, undulating, tight 97.85, 98.3' - Bedding plane (2), horizontal,		3/8" diameter 97.8-100.3' - yellowish gray, (5Y 5/2), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), 15-30% surface coverage of voids up	- - -
100 -57.8 -	101.0		1 NR	rough, undulating, tight 98.0' - Fracture, 80 deg, smooth to rough, undulating, with fragments along length from 97.55-98.5' 98.5, 98.7' - Fracture (2), 50 deg, smooth,		to 1/8", few large cavities up to 3/8", fossiliferous (molds)  No Recovery 100.3-101.0'	R13: 7 minutes -
- -			1 >10	stepped, V-shaped fractures 98.8, 99.2, 99.4' - Bedding plane or mechanical break (3), horizontal 99.4-99.5' - Fracture zone		Limestone - 101.0-103.9' - Same as 97.8-100.3' -	- - -
- - -	R14-NQ 5 ft 58%	16	>10	99.5' - Bedding plane, horizontal, rough, planar - 99.7, 100.0' - Bedding plane or mechanical break (2), <10 deg, smooth to rough, undulating, tight to 1" open -		- - - No Recovery 103.9-106.0'	- - -
105_ -62.8 -	400.0		NR	101.75' - Fracture, 40 deg, smooth to rough, stepped, up to 3/4" open 101.9-102.45' - Fracture zone 102.7' - Fracture, rough, undulating, conchoidal fracture plane, 1/4" open		-  -	R14: 9 minutes
- - -	106.0		>10	102.9, 103.1' - Fractures (2), 50 deg, smooth, stepped 103.25-103.9' - Fracture zone 103.55' - Fracture, 45 deg, smooth, planar 106.0-106.7' - Fracture zone		Limestone - 106.0-110.5' - pale yellowish brown, (10YR 6/2), fine to medium grained, moderate HCl reaction, weak to	-
-	R15-NQ 5 ft   90%	37	>10 1	106.8, 107.2' - Fractures (2), 70 deg, rough, stepped, tight to 1/8" open 107.05, 107.3' - Bedding plane (2), horizontal, rough, undulating		medium strong (R2 to R3), 25% voids <1/16" on surface, 5+ cavities up to 3/4"x1/4", faint horizontal white and black bands throughout core	- -
110 -67.8			1	107.4-107.9' - Fracture zone 107.9, 108.2' - Fractures (2), 60 deg, rough, undulating to stepped, up to 3/4" open 109.2' - Mechanical break, 65 deg 110.2' - Bedding plane or mechanical break,		-	16:00 - Reached total depth of 111.0' R15: 10 minutes
-	111.0		NR	horizontal, smooth, undulating, tight to 1/2" open		No Recovery 110.5-111.0'  Bottom of Boring at 111.0 ft bgs on 6/13/2007	Water level is 1.7' below ground surface on 6/14/07 at 08:00 before grouting and with casing still in hole



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-15	SHEET	1	OF	11	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 3-7/8 tri-cone bit

					wivi 100073, mad rotary, camead, Aws rods, 3-770 tire			OfficintAtion : Vertical
WATER	LEVELS	: 4.41 ft b	gs on 3/0	)6/07 S	START : 2/11/2007 END : 2/20/2007	LOGGER	: A.	Teal, R. Gomez
				STANDARD	SOIL DESCRIPTION		g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			SYMBOLIC LOG	
BH NO NO N		RECOVE		1231 HESULIS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		임	DEPTH OF CASING, DRILLING RATE,
FAC AT		I			MOISTURE CONTENT, RELATIVE DENSITY OR		B	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
E-B-F			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERA	LUGY	ΜX	INSTRUMENTATION
42.5				(N)			0)	Water level is based on Cround Water
42.5						_		Water level is based on Ground Water Monitoring at LNP site (FSAR Table -
								2.4.12.08)"
-						_		1
-						-		-
-						-		Materilevele net recorded division divilies
I _								Water levels not recorded during drilling
_						-		1
-						-		-
-						_		_
	4.5							
5			· ·		Poorly Graded Sand (SP)			]
37.5		1.5	SS-1	3-3-4	4.5-6.0' - grayish orange pink, (5YR 7/2), wet, very fine to fine grained, no HCl reaction, 20%	loose, —		-
-			00 .	(7)	organics, trace nonplastic fines, trace fine rou	nded _		-
-	6.0				gravel, silica sand			_
I _								
_						-		1
-						=		-
_						_		-
						_		
-	9.5					-		1
	9.5				Poorly Graded Sand (SP)	_	7, 5,	†
10 32.5			00.0	6-6-8	9.5-10.5' - pinkish gray, (5YR 8/1), wet, mediu	m —		_
JZ.J _		1.0	SS-2	(14)	dense, very fine to fine grained, no HCl reaction	on, trace		_
	11.0				nonplastic fines, trace black minerals, silica sa	and/		
_						-		1
-						=		-
-						-		
_								_
1 7								1
-	445					-		
-	14.5				Poorly Graded Sand (SP)	_		
15				3-3-2	14.5-15.4' - Same as 9.5-10.5' except loose			
27.5		0.9	SS-3	(5)				]
	16.0			(-)				]
-	1 3.0					-		1
-						=		-
-						-		-
_								]
						_		1
-						-		
-						=		
_	19.5					_		_
20								



DEPTH BELOW SURFACE AND ELEVATION (#)

22.5

12.5

35<sub>7.5</sub>

40

21.0

24.5

26.0

29.5

31.0

34.5

35.8

39.5

39.6

PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-15	SHEET	2	OF	11	

#### SOIL BORING LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical WATER LEVELS: 4.41 ft bgs on 3/06/07 LOGGER: A. Teal, R. Gomez START: 2/11/2007 END: 2/20/2007 SOIL DESCRIPTION COMMENTS STANDARD LOG PENETRATION TEST RESULTS SAMPLE INTERVAL (ft) SYMBOLIC SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, RECOVERY (ft) DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY 6"-6"-6" #TYPF (N) 1-1-0 Poorly Graded Sand (SP) Weight of hammer drove last 6' 1.1 SS-4 (1) 19.5-20.35' - Same as 14.5-15.4' Sandy Lean Clay (CL) 20.35-20.6' - light olive gray, (5Y 5/2), moist, very soft, low to medium plasticity, slow dilatancy, no HCI reaction, 35-40% very fine to fine silica sand Clayey Sand (SC) 24.5-26.0' - very pale orange, (10YR 8/2), moist, very 2-1-1 SS-5 1.5 loose, very fine to fine grained, no HCl reaction, 27% (2) fines, fat clay interbeds 1/8"-5/8" thick at 24.6', 24.8'. 25.2', 25.5', 25.85' and 25.95' (olive gray [5Y 4/1], moist, very soft, high plasticity, no dilatancy) Silt With Sand (ML) 29.5-30.7' - grayish orange, (10YR 7/4), moist, hard, 18-19-13 SS-6 1.2 nonplastic, very rapid dilatancy, mild to moderate HCI (32)reaction, 19% fine to medium sand sized, carbonate Silt With Sand (ML) 34.5-35.6' - dark yellowish orange, (10YR 6/6), moist, 21-42-50/4 SS-7 (92/10")hard, mild to moderate HCl reaction, 10-25% very fine to medium sand-sized (varies in sample), laminated beds of white at 35.1' and 35.3-35.6', all carbonate 0.0 SS-8 50/1.5 Limestone Fragments 39.5' - olive gray, (5Y 3/2), voids over 80-90% of surface, mild HCl reaction on unscratched surface, (50/1.5")moderate HCI reaction when scratched Switch to rock coring at 40' Begin Rock Coring at 40.0 ft bgs

See the next sheet for the rock core log



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	A-15	SHEET	3 OF 11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS: 4.4	1 ft b	gs on (	3/06/07 START : 2/11/2007 END : 2/	20/20	07 LOGGER : A. Teal, R. Gomez	
<b>₹</b> □₽	(%)			DISCONTINUITIES	90	LITHOLOGY	COMMENTS
ELO E AN ON (f	JN, AND RY (9	_	ZES JT	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
2.5 - -	40.0 R1-NQ 2 ft	70	3	40.0-40.2' - Fracture zone 40.35' - Fracture, vertical, rough, planar, tight 40.5' - Fracture, 10 deg, rough, undulating,		Limestone - 40.0-41.9' - light olive gray, (5Y 5/2), moderate to strong HCl reaction,	Begin rock coring at 40' Core run times were not recorded at the time of
_ _	95% 42.0		0 NR/	open .	H	medium strong to strong (R3 to R4), fossiliferous (casts) voids 60-70% coverage, few cavities up to 1/16" <b>No Recovery 41.9-42.0'</b>	drilling
_   _			0			Limestone 42.0-47.0' - Same as 40.0-41.9' except many cavities up to 1/4",	]
_	R2-NQ		4	43.3-43.4' - Fracture zone, rock fragments, coarse sand (1/16") to gravel (1") size 44.1' - Fracture, 5 deg, rough, undulating,	H	<ul> <li>voids (1/16") up to 60% coverage, very weak (R1) below 46.0'</li> </ul>	-
45 -2.5	5 ft 100%	60	6	open 44.25, 44.4' - Fracture (2), 88 deg and vertical, rough, planar, tight		- 	_
_   			5	44.5, 44.6' - Fractures (2), 10 deg, rough, undulating, <1" relief 44.85, 45.35' - Fractures (2), 40 deg, rough,		-	
_	47.0		2	planar, tight 45.55-45.7' - Fracture zone, rock fragments		Sandy Silt (SM)	]
- - - 50_ -7.5	R3-NQ 5 ft 62%	0	NA	from fine gravel (3/16") to coarse gravel (1"x2") size 45.9' - Fracture, 50 deg, rough, undulating, open 46.6' - Mechanical break 46.9' - Fracture zone, 10 deg, smooth, undulating, 1-1/4" relief 47.0-50.1' - Fracture zone, sandy silt, mostly loose indurated material, fractures very easily, some fractures may be mechanical		47.0-50.1' - light olive gray, (5Y 5/2), wet, 20-25% very fine to coarse grained sand, trace gravel-sized limestone fragments, thin (1/16-1/8") organic layers throughout (30% coverage), section compacted at 49.0-50.0' with no cementation	- - - -
- - -	50.0		NR	casily, some nactures may be mechanical	-	No Recovery 50.1-52.0'	
_ _	52.0		>10	52.0-57.0' - Fractures or mechanical break, mostly mechanical breaks due to soft material, partially lithified compacted		Limestone  - 52.0-53.8' - light olive gray, (5Y 5/2), fine grained, strong HCl reaction,	Loggers: A. Teal/ C. Dougherty
-	BANG		>10	fragments from silt to coarse sand, up to 1" sections	E	very weak (R1), black organic fragments (1/16"x3/16") distributed throughout the rock (<5%), generally horizontal orientation, poorly	
55 <u> </u>	R4-NQ 5 ft 84%	20	2	54.0' - Fracture, horizontal, rough, undulating, 3/8" relief 54.4' - Fracture, 3/16" open		forsiliferous 53.8-55.0' - moderate olive brown, (5Y 4/4), fine grained, strong HCl	_
_ _			>10			<ul> <li>reaction, very weak (R1), (&lt;1/16")</li> <li>voids about 70% of surface, poorly</li> <li>fossiliferous, black organic fragments</li> </ul>	
_	57.0		NR			- as for 52.0-53.8' above, but more (still <5%) 55.0-56.2' - Same as 52.0-53.8'	
- -			4	57.25' - Fracture, 15 deg, smooth, undulating, <1" open 57.5, 60.8' - Fractures (2), 20 deg, rough,		except more abundant black organics     No Recovery 56.2-57.0'	
-			0	undulating, open 57.8' - Fractures (2), 20 deg, rough, undulating, open 57.8' - Fracture, 10 deg, smooth, planar, tight, lignite lamination 3/8" thick	Ħ		
60	R5-NQ 5 ft 100%	80	1	57.95' - Fracture, 60 deg, rough, undulating to planar, tight		-	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-15	SHEET	4	OF	11	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION: Vertical WATER LEVELS: 4.41 ft bgs on 3/06/07 START: 2/11/2007 END: 2/20/2007 LOGGER: A. Teal, R. Gomez DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND WEATHERING, HARDNESS, AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -17.5 58.3, 58.7, 59.1, 59.7, 61.1' - Mechanical Limestone 3 break (5) 57.0-62.0' - Same as 53.8-55.0' 59.4' - Fracture, 10 deg, smooth, undulating, except laminations of organic tiaht material present throughout, 60.5' - Fracture, 10 deg, rough, undulating apparent bioturbation zone from 2 62.0 61 7-62 0' 61.7' - Fracture, 5 deg, smooth, undulating, Limestone <1" relief 5 62.0' - Fracture, 15 deg, rough, undulating, 62.0-62.5' - dusky yellow, (5Y 6/4), open, 1-1/4" relief fine grained, moderate HCl reaction, 62.1, 62.3, 62.4, 62.5' - Fracture zone (4), 10 0 very weak (R1), laminations of deg, smooth, undulating, open organic material about 25% 62.5-63.4' - dusky yellow, (5Y 6/4), 62.15' - Fracture, 25 deg, rough, undulating, fine grained, strong HCI reaction, <1" relief R6-NQ extremely weak (R0), crumbles 62.5-63.4' - Fracture zone, soft, partially 5 ft 28% 0 easily to silt-sized particles 65 lithified limestone fragments No Recovery 63.4-67.0' -22 5 NR 17:00 7/12/07 End of 67.0 drilling for the day, at 67' Limestone 67.2, 67.4' - Fractures (2), 15 deg, rough, 67.0-70.2' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak (R2), voids (<1/16") over 60% 3 undulating, open 67.3' - Fracture, 30 deg, rough, undulating, open 1 of surface, laminations of organic 68.4' - Fracture, 70 deg, rough, planar, tight material (<5%) most are in zone from 67.8-68.7 R7-NO 5 ft 46 3 69.4, 69.7' - Fractures (2), 10 deg, rough, 70 undulating, tight, open at 69.7' 69.5, 70.0' - Fractures (2), 80 deg and -27 5 70.2-71.0' - Same as 62.5-63.4' >10 vertical, rough, planar, tight 70.2-72.0' - Fracture zone, soft, partially >10 lithified limestone fragments 71.0-71.4' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, NR 72.0 very weak (R1), voids (<1/16") over 72.0-72.6' - Fracture zone, limestone 30% of surface, few organic >10 laminations fragments from silt to gravel-sized No Recovery 71.4-72.0' Limestone 72.0-74.7' - yellowish gray, (5Y7/2), fine graned, strong HCl reaction 1 73.4, 75.2' - Mechanical break weak (R2), voids (<1/16") over 80% of surface, few larger (up to 3/8") 73.9' - Fracture, 60 deg, rough, planar, tight R8-NQ 0 5 ft 68 voids, except larger voids are 10% of surface from 74.0-74.7', moderately 86%  $-32.\overline{5}$ fossiliferous, few black organic 0 fragments 74.7-76.3' - dusky yellow, (5Y 6/4), fine grained, strong HCI reaction, 76.3' - Fracture, 5 deg, rough, undulating, NR very weak to weak (R1 to R2), voids tight 77.0 (<1/16") over 75% of surface, few SC-1 collected at 77.0black organic fragments 1 77.85' No Recovery 76.3-77.0' 77.85' - Fracture, horizontal, smooth, Limestone undulating, tight 77.0-79.4' - Same as 74.7-76.3' 1 78.65' - Fracture, 10 deg, rough, undulating, R9-NQ tight >10 79.2-79.4' - Fracture zone. limestone 5 ft 78% 70 fragments, gravel to cobble-sized 80



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-15	SHEET	5	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS: 4.4	1 ft b	gs on :	3/06/07 START : 2/11/2007 END : 2/2	20/20	07 LOGGER : A. Teal, R. Gomez	
≳Q⊋	(%			DISCONTINUITIES	ا و	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR ELE	COR	A Q	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-37.5 -			0	79.8, 78.3, 80.4' - Mechanical break (3)	E	Limestone - 79.4-80.9' - yellowish gray, (5Y 7/2),	
-				-	片	fine grained, moderate HCl reaction, weak to medium strong (R2 to R3),	
-	82.0		NR	-	H	<ul> <li>voids (&lt;1/16") over 80% of surface, few larger (up to 3/16") voids,</li> </ul>	-
-			>10	82.0-82.5' - Fracture zone, limestone fragments, coarse sand cobble-sized 82.65' - Fracture, 60 deg, smooth, undulating,		moderately fossiliferous  No Recovery 80.9-82.0' Limestone	Many of the fragments at 82.0-82.5' show tooling marks from drilling;
_			2	open 83.35' - Fracture, 25 deg, rough, undulating,	H	82.0-86.7' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl	fragmentation could be result of drilling
-	R10-NQ			open 83.7, 84.0, 84.1, 84.15' - Bedding plane (4),	H	reaction, very weak to weak (R1 to R2), voids (<1/16") over 80% of	
85	5 ft 94%	30	>10	organic beds, black, thin laminations -84.4-85.3' - Fracture zone, limestone		surface, moderately fossiliferous, zones at 83.7-84.0' and 86.3-86.7'	-
-42.5 -			1	fragments from silt to cobble-sized	Е	have few voids, black organic laminations (20%), and color closer	
-				85.75' - Fracture, 25 deg, rough, undulating,	H	to yellowish gray 5Y 7/2	-
-	87.0		2 NR	tight 86.0, 86.2' - Fractures (2), 30 deg, rough,	F	No Deceyons 96 7 97 0	-
	07.0		3	undulating, 2-1/2" relief at 86.0', open at 86.2' 87.1, 87.15' - Fractures (2), 5 deg and 10		No Recovery 86.7-87.0' Limestone	-
_				deg, smooth, undulating, open 87.45-87.75' - Fracture zone, limestone	H	- 87.0-90.95' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction,	_
-			2	fragments, gravel to cobble-sized 88.0, 89.0' - Fractures (2), 20 deg and 10	H	weak to medium strong (R2 to R3), voids (<1/16") over 85% of surface	-
-	R11-NQ			deg, rough, undulating, open 88.45' - Fracture, 70 deg, smooth, planar,	Ħ	only 30% below 90.3'), larger (up to 3/8") voids over <5% of surface with	-
90	5 ft 79%	46	3	tight =	H	most between 89.0 -90.3', larger voids are fossil molds, moderately	
-47. <del>5</del>			1	deg, rough, undulating, open at 89.2', 2-1/2" relief at 90.4'	士	fossiliferous -	-
-		89.45' - Fracture, 70 deg, rough, planar, ope 89.8, 90.0' - Mechanical break (2)			扛	_ No Recovery 90.95-92.0'	-
_	92.0		NR		H	<del>-</del> -	_
_			3	92.2' - Fracture, 75 deg, smooth, planar,		<b>Limestone</b> - 92.0-96.6' - yellowish gray, (5Y 7/2),	-
-				open 92.75, 92.95' - Fractures (2), 20 deg, smooth,	卄	fine grained, moderate HCl reaction, weak to medium strong (R2 to R3),	-
-			3	undulating, tight 93.0' - Fracture, vertical, smooth, planar, tight	Ħ	<ul> <li>voids (1/16") over 30% of surface, few larger (up to 3/8") voids, poorly to</li> </ul>	-
_	R12-NQ 5 ft	49	3	93.2, 93.4' - Fractures (2), 20 deg, smooth, undulating, open at 93.2', tight at 93.4'	片	moderately fossiliferous, rock appears to continue from material at	
95 <u> </u>	92%			93.7' - Mechanical break 94.0' - Fracture, 70 deg, rough, planar, open —	臣	90.3 -91.0', some organic laminations below 96.0', also more	SC-2 collected at 94.95-
-			0	94.2, 94.35' - Fractures (2), 15 deg, rough, undulating, open	Ь	<ul> <li>abundant fossils</li> </ul>	95.8'
_			4		ፗ	<del>-</del>	_
-	97.0		NR	-	F	No Recovery 96.6-97.0' Limestone	-
-			2	97.3' - Fracture, 20 deg, rough, undulating, - <1" relief		- 97.0-97.5' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction,	-
-				97.95-98.3' - Fracture zone, 60 deg, smooth, planar, tight/multiple fractures -	E	medium strong (R3), matrix with	-
_			2	98.6' - Fracture, horizontal, rough, undulating,	H	- abundant voids (<1/16"), very fossiliferous at 97.3-97.5', yellowish	]
-	R13-NQ 5 ft	60	2	open 99.3' - Fracture, 10 deg, rough, undulating, -	Ħ	gray (5Y 7/2) fragments held in matrix have few voids	-
100	100%			2-1/2" relief	Ħ		
i	1		ı		1	Ī	Ī



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-15	SHEET	6	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

				112141 : OME 330 3/14 180073, Mad 18tary, 140 18013, 1444	<u> </u>		ONENTATION: Vertical
WATER	LEVELS: 4.4	1 ft b	gs on	3/06/07 START : 2/11/2007 END : 2/2	20/200	D7 LOGGER : A. Teal, R. Gomez	
				DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	F00	DOCK TABLE COLOR	
	L. A. G.	(9	FRACTURES PER FOOT	BESONII HON	SYMBOLIC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
E A E	# F E E	(%) 🛭	L 로 로 로 로 로 로 로 로 로 로 ー に に に に に に に に に に に に に	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30L	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	ORI ECCENT	Ø	E A	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ϋ́	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	Olik	œ	正品		S		·
-57.5				99.9' - Fracture, 50 deg, rough, planar, tight	Щ	Limestone	
_			1	100' - Fracture, 75 deg, rough, planar, tight - 100.5' - Fracture, 45 deg, rough, undulating,	Н	<ul> <li>97.5-98.3' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction,</li> </ul>	1
-				open		medium strong (R3), few voids	-
_			1	- open	ш	- 98.3-102.0' - dusky yellow, (5Y 6/4),	
	102.0		'	101.6' - Fracture, 70 deg, rough, undulating,		fine grained, moderate HCl reaction,	
I -				1-1/4" relief		medium strong (R3), voids (<1/16")	
-			3	101.65' - Fracture, 25 deg, rough, undulating,	ш	over 85% of surface, few larger (up	1
-				tight 102.25, 102.7' - Fractures (2), 30 deg and 10	Н	to 3/8") voids, few organic laminations, moderately fossiliferous	-
l _			3	deg, rough, undulating, open		- 102.0-106.6' - Same as 98.3-102.0'	Bioturbation zones are
			ا	102.4' - Fracture, 70 deg, smooth, planar,	Ш	except area of intermixed material	highly HCl reactive, matrix
-	R14-NQ			tight -	Н	yellowish gray 5Y 7/2, with few	has slow to moderate HCl
-	5 ft	51	2	103.2' - Fracture, 5 deg, smooth, undulating,		<ul> <li>voids) from 102.3-103.3', larger voids</li> </ul>	reaction
105_	92%			tight	Ш	(up to 3/8") and fossil molds/casts	
-62.5			l . [	103.5' - Fracture, 40 deg, rough, undulating, — 3-1/2" relief	$\vdash$	more common, zone from	1
1 -			1	103.8' - Fracture, 40 deg, smooth, planar,		<ul> <li>104.0-104.5' appears more moderate olive brown (5Y 4/4) in color</li> </ul>	1 1
-			$\vdash$	tight -	Ш		SC-3 collected at 105.75-
l -			1	104.2' - Fracture, 25 deg, smooth, undulating,	Н	_	106.6'
	107.0		NR	open		No Recovery 106.6-107.0'	
-	101.0			104.2-104.7' - Fracture zone, cobble-sized	ш	Limestone	1
-			1	rock fragments 105.75' - Fracture, 60 deg, rough, stepped,	Н	<ul> <li>107.0-111.8' - dusky yellow, (5Y 6/4),</li> </ul>	-
l _				3-1/2" relief		_ fine grained, moderate to strong HCl	
				106.6' - Fracture, 15 deg, rough, undulating,	Ш	reaction, weak (R2), voids (<1/16")	
-			2	open	Н	<ul> <li>over 80% of surface, larger (up to 3/8") voids and fossil molds/casts</li> </ul>	1
-	R15-NQ			107.7, 109.4' - Fracture (2), 25 deg, rough, -		cover up to 5% of surface,	1
_	5 ft	86	2	undulating, 2-1/2" relief for 107.7', open for		- moderately fossiliferous, particularly	
110	96%			109.4'	Н	at 107.8-109.5'	
-67.5				108.0, 108.5' - Fractures (2), 35 deg, rough, — undulating, tight for 108.0', open for 108.5'			
-			1	109.7' - Fracture, 20 deg, rough, undulating,	ш	_	SC-4 collected at 110.35-
-			<u> </u>	open -	$\vdash$	_	111.35'
I _			2	109.85' - Mechanical break		_	]
1	112.0			110.35, 111.35' - Fractures (2), 40 deg and 5	Ш	No December 444 0 440 0	1
-			NR.	deg, rough, undulating, tight for 110.35', open - for 111.35'	$\vdash$	<ul> <li>No Recovery 111.8-112.0'</li> <li>Limestone</li> </ul>	1 1
-			2	111.6' - Fracture, 15 deg, smooth, undulating,		112.0-117.0' - Same as 107.0-111.8'	1 -
I -			<u> </u>	open -	Ш	except medium strong (R3)	]
			_	112.0-112.5' - Fracture zone, limestone	$\vdash$		]
I -			5	fragments, gravel to cobble-sized			1
-	R16-NQ			112.8, 113.2' - Fractures (2), 70 deg, smooth,	ш	_	1 -
I -	5 ft	44	3	planar, open 113.2, 113.5' - Fractures (2), 10 deg and 15	H	_	1
115	100%	• •		deg, rough, undulating, open			]
-72.5				113.7, 113.85' - Fractures (2), 20 deg, rough,	Ш		1 7
1 -			6	undulating, open	$\vdash$		1 +
-				114.0' - Fracture, 30 deg, rough, undulating,			] -
I _			0	tight	Ш	_	l J
	117.0			114.1' - Fracture, 40 deg, smooth, undulating, tight	$\vdash$		1
I -				114.9, 115.0' - Fractures (2), 50 deg, smooth,		117.0-118.7' - Same as 112.0-117.0'	1 1
-			4	planar, tight	ш	-	1 -
I -				115.2, 115.6' - Fracture (2), 60 deg, smooth, _	$\vdash$	_	SC-5 collected at 117.7-
				planar, tight			118.7'
1 -			1	115.45' - Fracture, 25 deg, smooth,	ш	-	1 1
-	R17-NQ		$\vdash$	undulating, tight 115.7' - Fracture, 30 deg, smooth, undulating,	$\vdash$	_	1
I -	5 ft	62	3	open -		_	_
120	94%		Ľ	-F-··	Ш		
1					I		1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-15	SHEET	7	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

CORING	METHOD A	ND F	JUIN	IENT: CME 550 S/N 186073, mud rotary, NQ tools, NW	casing	]	ORIENTATION : Vertical
WATER	LEVELS: 4.4	11 ft b	gs on	3/06/07 START : 2/11/2007 END : 2/	20/20	D7 LOGGER : A. Teal, R. Gomez	
				DISCONTINUITIES	ניז	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-77.5 - - - - - - - - - - - - - - - - - - -	122.0 R18-NC 5 ft 46%		3 1 NR >10 >10 NR NR	115.75' - Fracture, 5 deg, rough, undulating, open 117.25, 117.30, 119.1' - Fractures (3), 25 deg, smooth, undulating, tight for 117.25' and 117.30', open for 119.1' 117.6, 119.3' - Fractures (2), 5 deg, smooth, undulating, tight for 117.6', open for 119.3' 117.7, 118.7' - Fractures (2), 45 deg, smooth, planar, tight 119.25' - Fracture, 20 deg, smooth, undulating, tight 120.1' - Fracture, 15 deg, smooth, undulating, open 120.8, 120.9' - Fractures (2), 30 deg and 45 deg, smooth, planar, tight 121.2' - Fracture, 25 deg, smooth, undulating, open 122.0-124.3' - Fracture zone or mechanical break, fragmented		Limestone  118.7-120.7' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 60% of surface, few larger (up to 3/16") voids, gradual color change to dusky yellow (5Y 6/4) at bottom foot of interval  120.7-121.7' - mottled dusky yellow and yellowish gray, (5Y 6/4 and 5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), voids (<1/16") over 80% of surface of yellow-colored areas and 30% in gray areas No Recovery 121.7-122.0' Limestone Fragments  122.0-124.3' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, moderate to strong HCl reaction, medium strong to strong (R3 to R4), voids (<1/16") over 30-60% of surface, a 5" section core	Inner sample barrel not locked in while coring runs R18 and R19 and no core was recovered in sample barrel; after pulling outer core barrel 2.3' of core was found in outer barrel; recovered core is assumed to come from 122.0-124.3' at top of R18
- - 130 -87.5 -	R19-NC 5 ft 0%	0	NR			has no voids, with laminated alternating colors, strong (R4), fine grained, strong HCl reaction  No Recovery 124.3-132.0'	- - - - - - -
135 -92.5 - - - - - - - -	R20-NC 5 ft 72%  137.0  R21-NC 5 ft 84%	19	3 5 4 4 NR 4 2 4	132.0-132.2' - Fracture zone, gravel-sized limestone fragments 132.35' - Fracture, 5 deg, rough, undulating, open 132.85' - Fracture, 5 deg, smooth, planar, open 133.0, 133.3' - Fractures (2), 40 deg and 5 deg, smooth, planar, open for 133.0', very tight for 133.3' 133.05, 133.35' - Fractures (2), 5 deg, smooth, planar, very tight 133.5, 134.55' - Fractures (2), 5 deg and 15 deg, rough, undulating, open 134.0, 134.25' - Fractures (2), horizontal, rough, undulating, open 134.7' - Fracture, 10 deg, smooth, undulating, open 135.0' - Fracture, 5 deg, rough, undulating, open 135.0-135.2' - Fracture zone, limestone fragments, gravel to cobble-sized 135.3' - Fracture, horizontal, smooth, planar, very tight		Limestone  132.0-133.4' - light olive gray grading to yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), voids (<1/16") over 30% of surface, larger (up to 3/8") voids and fossils molds/casts over 5% of surface, laminated coloration and few voids from 132.7-133.2'  133.4-135.0' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 80% of surface, larger (up to 3/8"x3/4") voids and fossil molds over 10% of surface  135.0-135.6' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids (1/16") over 5% of surface, laminated coloration, some laminations of organic material  No Recovery 135.6-137.0'	Core from R20 stuck in outer core barrel, driller had to pull outer barrel (137.0') out of hole; 3.6' of core recovered; scratches, scores, and tool marks on many pieces of core from drilling; many fractures in R20 could be drilling induced



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-15	SHEET	8	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

	- WETTIOD 7	10 0	<u> </u>	ILINT . CIVIL 330 3/11 100073, Hidd Totally, NQ tools, NVV	odoni	9	ORILINTATION : Vertical
WATER	LEVELS: 4.4	11 ft b	gs on	3/06/07 START : 2/11/2007 END : 2/	20/20	07 LOGGER : A. Teal, R. Gomez	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
종무(Đ	_(%)			DECODIDATION	<b>-</b> 8		
H N N	₹AΣ	_	ZES _	DESCRIPTION	J	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
프랑턴	SE, A	(%) <sub>Q</sub>	128	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	긍	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
<u></u>	#P.50	۵	SP	PLANARITY, INFILLING MATERIAL AND	ĕ	AND ROCK MASS	SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	S S	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-97.5				125 5' Fracture 5 deg amonth undulating	H	Limentone	-
-91.5			1	135.5' - Fracture, 5 deg, smooth, undulating, open	┸	<b>Limestone</b> - 137.0-137.6' - Same as 135.0-136.6'	
			'	137.3' - Fracture, vertical, rough, planar, tight		except light colored (dusky yellow	
-			2	137.6' - Fracture, horizontal, smooth,	╁	(5Y 6/4)) laminations have increasing	1
_			-	undulating, open	╨	- amount of voids	1
	142.0		NR	137.8, 138.15' - Fractures (2), 5 deg, rough,	Н	137.6-141.2' - dusky yellow, (5Y 6/4),	
-				undulating, tight	+-	fine grained, moderate to strong HCl	1
-			>10	137.9, 138.6' - Fractures (2), 15 deg and 70		<ul> <li>reaction, medium strong (R3), voids</li> </ul>	1
				deg, rough, undulating, tight for 137.9', open	$\vdash$	(<1/16") over 75% of surface	
-				with gray staining at 138.6'	╨	decreasing to 40% below 139.5',	SC-6 collected at 143.0-
-			>10	139.0, 139.55' - Fractures (2), 70 deg and 15	+	<ul> <li>moderately fossiliferous, molds up to</li> </ul>	144.0'
_				deg, rough, undulating, open, gray staining		3/16"x9/16", few black organic	
	R22-NQ			139.2' - Fracture, 50 deg, rough, planar,	ш	laminations at 138.5-139.8', few	
<b> </b>	5 ft	55	>10	open, gray staining	╁	inclusions (3/16"x3/4") of grey	1
145_	94%			139.9, 141.1' - Fractures (2), 5 deg, smooth, undulating, tight	╀	limestone material at 138.0' and 139.9'	
-102.5			_	140.45, 141.25' - Fractures (2), 30 deg and		No Recovery 141.2-142.0'	
_			3	20 deg, rough, undulating, open	1_	Limestone	1
-				142.0-143.0, 144.0-145.1' - Fracture zone or	╨	142.0-144.0' - mottled medium light	-
l _			2	mechanical break (2), sections crushed,	一	gray and yellowish gray, (N6, 5Y 7/2),	
	147.0		NR	limestone fragments from gravel to		fine grained, moderate HCl reaction,	
-	147.0		INIX	cobble-sized o		yellowish gray is in bands around	1
-			3	145.2' - Fracture, 60 deg, rough, undulating,	ᅪ	cavities, few voids (<1/16"), several	_
				open	Н	larger (up to 3/8") voids and fossil	
_				145.3, 145.5' - Fractures (2), 15 deg, rough,	$\top$	molds	1
-			2	undulating, open, moderate yellowish brown	-	_ 144.0-145.5' - yellowish gray, (5Y	-
l _				(10Y 5/4) to dusky brown (5Y 2/2) staining	Щ	7/2), fine grained, moderate HCI	
	R23-NQ			145.9' - Mechanical break 146.6, 146.9' - Fractures (2), horizontal and	$\vdash$	reaction, medium strong (R3), voids	
-	5 ft	62	4	50 deg, smooth, planar, tight	+-	(<1/16") 30% coverage, larger voids (up to 3/4") 15%, organic material on	1
150_	88%			147.30, 147.6' - Fractures (2), 60 deg,	<b>⋣</b>	irregular bedding plane and fracture	
-107.5				smooth, planar, tight	<b>L</b>	surfaces, moderately to very	
_			6	147.35' - Fracture, 20 deg, smooth,	╨	fossiliferous, gradational contact with	1
-				undulating, open	╁┰	- material below	-
I _			2	148.22' - Fracture, 5 deg, smooth, planar,		_ 145.5-146.7' - yellowish gray, (5Y	
	152.0		NR	tight, moderate yellowish brown (10Y 5/4) to	ш	7/2), fine grained, moderate HCl	
1 -	102.0			dusky brown (5Y 2/2) staining	╁	reaction, medium strong (R3), few	-
-			1	148.4' - Fracture, 15 deg, rough, undulating,	╀	voids (1/16"), no larger voids, organic	-
1				open, partial coverage up to 20% of		lamination	
I -				moderate yellowish brown (10Y 5/4) to dusky	1	- No Recovery 146.7-147.0'	1
-			0	brown (5Y 2/2) staining 149' - Fracture, 70 deg, rough, planar, open	╁	Limestone 147.0-151.4' - light olive gray, (5Y	-
I -				149.3' - Fracture, 70 deg, rough, planar, open	一	- 5/2), fine grained, moderate HCl	]
	R24-NQ			open		reaction, medium strong (R3), voids	1
I	5 ft	78	2	149.4, 149.6' - Fractures (2), 75 deg, rough,	ш	(<1/16") over 30% of surface, more	1
155_	100%			planar, tight	ᅪ	abundant in zone from 147.3-148.8'	-
-112.5				150' - Fracture, 60 deg, rough, planar, tight	$\vdash$	and 150.0-151.0', fossiliferous in	
I -			2	150.1' - Fracture, 60 deg, slickensided,		same zones, black staining is on	1
-			-	planar, very tight, light to dark brown staining	+	uneven and irregularly laminated	-
I _			1	(possibly hematite)	┵	bedding at 148.1-148.8', clasts (up to	]
	157.0		'	150.6' - Fracture, 50 deg, smooth, undulating,	$\vdash$	3/8"x1-3/16") of yellowish gray (5Y	
I -	101.0			open 150.65, 150.8', Fractures (2), 30 dec. and 10		<ul> <li>7/2) limestone without voids appear imbedded in the core from</li> </ul>	1
I -			3	150.65, 150.8' - Fractures (2), 30 deg and 10 deg, smooth, undulating, tight	$\perp \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \!$	147.0-148.0', coloration on bedding	-
				150.9' - Fracture, 40 deg, smooth, undulating,	$\vdash$	ranging from light olive gray (5Y 5/2)	
I -				tight	┰┷	to dusky yellow (5Y 6/4)	1
I -			1	151.3, 151.5' - Fractures (2), 5 deg and 35	<del>L</del> T	No Recovery 151.4-152.0'	-
I _				deg, smooth, undulating, open	$\Box$		]
1	R25-NQ			152.0-152.9' - Fracture zone, limestone	$\vdash$		
400	5 ft	50	2	fragments, gravel to cobble-sized	+	-	1
160	100%				+		_
					1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-15	SHEET	9	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

				12.141 : OME 550 5/14 100075, Hidd Totally, 14Q tools, 1444			ONENTATION: Vertical
WATER	LEVELS: 4.4	11 ft b	gs on	3/06/07 START : 2/11/2007 END : 2/	20/20	D7 LOGGER : A. Teal, R. Gomez	
				DISCONTINUITIES	ניז	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		Ś	DESCRIPTION	F00	ROCK TYPE, COLOR,	
필시	N A S	(9)	뿐	22001111 11011	윽	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
A FAC	E R OVE	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
<u> </u>	N N N N N N N N N N N N N N N N N N N	Ø	RA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Σ×	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	038	ď		THICKNESS, SURFACE STAINING, AND HIGHTNESS	Ś	CHARACTERISTICS	
-117.5				152.9' - Fracture, 5 deg, smooth, undulating,	Ш	Limestone	
_	1		1	open	1	- 152.0-155.7' - Same as 147.0-151.4'	1
-	-			154.4' - Fracture, 45 deg, rough, planar, tight 154.9, 156.7, 156.9' - Mechanical break (3)		except fewer (now 10%) voids (<1/16") covering surface, thin	1
l -			3	155.2' - Fracture, 10 deg, smooth, undulating,	ш	bedding from 153.5-155.0', uneven	
	162.0		ਁ	open	Н	and irregular laminations from	
-				155.7' - Fracture, horizontal, smooth, planar,		155.2-155.7'	1
-	-		1	tight	ш	- 155.7-157.0' - light olive gray, (5Y	1
-				156.5' - Fracture, 30 deg, rough, undulating,	╆┯	5/2), fine grained, moderate HCI	
			5	open 157.2' - Fracture, 75 deg, rough, planar, open		reaction, medium strong to strong (R3 to R4), few (<5%) voids or fossil	
			)	157.2 - Fracture, 73 deg, rough, planar, open 157.4' - Fracture, 20 deg, rough, undulating,	Ш	molds/casts, thin bedding (1/4") from	
-	R26-NQ			open	+	155.7-157.0', olive gray (5Y 3/2)	1
-	5 ft	32	3	157.8, 158.4' - Fractures (2), 25 deg and 10		<ul> <li>coloration along healed fracture at</li> </ul>	-
165_	84%			deg, rough, undulating, tight for 157.8', open	Щ	156.8-157.0'	
-122.5				for 158.4'	H	157.0-157.4' - Same as 155.7-157.0'	
-			4	158.4-159.0' - Fracture zone, limestone fragments, gravel to cobble-sized		<ul> <li>157.4-158.8' - fragments of light olive gray (35%) and yellowish gray (15%)</li> </ul>	1 1
-			2	159.5- 159.7' - Fracture zone, limestone	ш	in a dusky yellow matrix (50%), (5Y	-
l _			2	fragments, gravel to cobble-sized	Н	_ 5/2 and 5Y 7/2 in 5Y 6/4), fine	
	167.0		NR	159.5' - Fracture, 5 deg, smooth, planar, tight		grained, moderate HCl reaction,	
-	107.0			159.9, 160.4' - Fractures (2), 40 deg, smooth,	ш	medium strong (R3), voids (<1/16")	1
-	-		0	undulating, tight	+	over 50% of matrix area but only	-
l -				161.0' - Fracture, 15 deg, smooth, undulating,		10% of other areas, larger (up to 3/16"x3/8") voids and fossil	
			_	open 161.2' - Fracture, 85 deg, smooth, planar,		_ casts/molds over 5% of area overall	
-	1		0	tight	Н	158.8-160.0' - yellowish gray, (5Y	1
-	R27-NQ			161.3' - Fracture, 20 deg, smooth, undulating,		7/2), fine grained, moderate HCl	1
l -	5 ft	62	2	open		reaction, strong (R4), voids (<1/16")	_
170	100%			161.3-162.0' - Fracture, limestone fragments,	Н	over 5% of surface, mainly in thin	
-127.5				gravel to cobble-sized — 162.4, 163.15' - Fractures (2), 10 deg and 25		— (1/2") zones, thinly bedded, few fossil casts	
-	1		2	deg, rough, undulating, open	ш	160.0-162.0' - mottled light olive gray	1
-	-			163.0' - Fracture, 20 deg, smooth, planar,	+	and dusky yellow, (5Y 5/2 and 5Y	-
			0	tight		6/4), fine grained, moderate to mild	
	172.0			163.15-164.2' - Fracture zone, limestone	Щ	HCl reaction, medium strong to	1
-				fragments, gravel to cobble-sized	+	- strong (R3 to R4), voids (1/16") cover	1 1
1 -			6	164.0' - Fracture, 60 deg, rough, undulating, tight	口	70% of surface, few large voids, fragments of other limestone material	-
I -				165.0, 165.05' - Fractures (2), 15 deg and 5	H	- imbedded in dusky yellow matrix	1 4
			<b>-10</b>	deg, smooth, undulating, open	H	below 161.0'	
I -	]		>10	165.3' - Fracture, 80 deg, rough, planar, open		162.0-166.2' - moderate olive brown	1
-	R28-NQ		$\vdash$	165.5' - Fracture, 35 deg, rough, undulating,	╁╨┤	grading to light olive gray by 165.0',	-
-	5 ft	30	>10	open 165.5-166.0' - Fracture zone, limestone	$\Box$	(5Y 4/4 to 5Y 5/2), fine grained, moderate to mild HCl reaction,	-
175_	100%			fragments, gravel to cobble-sized —	Д	— strong (R4), voids (1/16") only 5%	
-132.5				167.0-168.8' - Fracture zone, limestone	Н	from surface area except zones from	
-			4	fragments, gravel to cobble-sized	f f	163.0-163.3' and 165.4-166.0', few	1 1
-				169.2' - Fracture, 5 deg, smooth, planar, tight	口	_ larger voids (up to 3/16") below	-
1 -			3	169.4' - Fracture, 30 deg, rough, undulating,	Н	165.4', uneven and disturbed	]
	177.0			tight 170.2, 170.4' - Fractures (2), 10 deg, smooth,	Ш	bedding below 165.6' No Recovery 166.2-167.0'	
1 -	1			undulating, tight		Limestone	1
-			>10	172.25' - Fracture, 40 deg, rough, planar,	╀┦	167.0-167.9' - Same as 162.0-166.2'	1 -
I -				tight		<ul><li>except presence of breccia (1"</li></ul>	1 4
			_40	172.3, 172.8' - Fractures (2), 5 deg, rough,		fragments) at 167.3-167.9'	
I -	]		>10	ariadianing, ngrit	14	167.9-169.0' - dusky yellow, (5Y 6/4),	1
-	R29-NQ		$\vdash$	172.55' - Fracture, 15 deg, rough, stepped, open		mild to moderate HCl reaction, medium strong (R3), voids (<1/16")	-
-	5 ft	0	3	172.75' - Fractures, 10 deg, rough,	口	over 80% of surface	-
180	100%			undulating, tight	$\vdash$		
1			ı		1		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-15	SHEET	10	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS: 4.4	1 ft bo	gs on 3	3/06/07 START : 2/11/2007 END : 2/	20/200	D7 LOGGER : A. Teal, R. Gomez					
≥0≘	ୃତ୍ତ			DISCONTINUITIES	၂၀	LITHOLOGY	COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.				
-137.5	034			172.95' - Fracture, 40 deg, rough, stepped,	1 1	Limestone					
- - -			0	tight 173.2' - Fracture, 40 deg, rough, planar, tight 173.4' - Fracture, 50 deg, rough, undulating, open		<ul> <li>169.0-169.4' - yellowish gray, (5Y</li> <li>7/2), fine grained, moderate HCl reaction, strong (R4), few voids or cavities</li> </ul>					
-	182.0		>10	173.45, 174.5' - Fractures (2), 5 deg and 20 deg, smooth, undulating, open 173.6, 173.75' - Fractures (2), 10 deg, smooth, undulating, tight		169.4-172.0' - light olive gray, (5Y 5/2), fine grained, moderate HCI reaction, medium strong (R3), voids (<1/16") over 20% of surface (up to	R30: 10 minutes				
_			>10	174.5-175.0' - Fracture zone, limestone fragments, gravel to cobble-sized 175.2' - Fracture, 10 deg, smooth, undulating,		50% from 169.4-170.0'), laminated bedding below 171.0' at an angle of 5-10 degrees					
- 185_ -142.5	R30-NQ 5 ft 90%	27	>10	tight 175.25, 175.4' - Fractures (2), 75 deg and 15 deg, rough, undulating, open 175.8' - Fracture, 80 deg, rough, planar, open		172.0-177.0' - Same as 169.4-172.0' - except more voids (up to 50% coverage) from 173.5-174.5' and presence of cavities (up to	SC-7 collected at 185.0-				
- -			0	to tight 176.5' - Mechanical break 176.75' - Fracture, 30 deg, rough, planar, tight		_ 3/16"x3/4") below 175.0', laminated bedding 174.8-175.3' - 177.0-178.0' - Same as 172.0-177.0' _ 178.0-178.6' - light olive gray, (5Y	186.0'				
_	187.0		NR	177.0-182.0' - Fracture, no piece longer than	Н	5/2), fine grained, moderate HCl					
_	R31-NQ 5 ft 100%		1	5", most fractures could be from drilling, others appear to be in place 179.1' - Fracture, 70 deg, rough, planar, open		reaction, weak (R2), voids (<1/16") over 40% of surface 178.6-182.0' - dusky yellow to light					
- - -			3	179.3, 179.5 - Fractures (2), 20 deg and 10 deg, rough, undulating, open 180.2' - Fracture, 20 deg, rough, planar, open		<ul> <li>olive gray, (5Y 6/4 to 5Y 5/2), fine</li> <li>grained, moderate HCl reaction,</li> <li>medium strong (R3), voids (1/16")</li> </ul>					
		38	3	182.0-185.0' - Fracture zone or mechanical break, no piece longer than 5", most fractures could be from drilling, others appear	Ħ	over 50% of surface area below 180.0', breccia and dark stained laminated bedding below 180.5',	Bioturbation zones appear to be becoming more linear				
190 <u> </u>									3	to be in place — 182.3, 182.5' - Fractures (2), 70 deg and 25 deg, rough, undulating, open for 182.3', tight	H
-	192.0		1	for 182.5' 182.8' - Fracture, 30 deg, smooth, undulating, tight, dusky brown to dusky yellow infilling		<ul> <li>laminations (uneven and irregular) of yellowish gray, (5Y 5/2 with 5Y 7/2), moderate HCI reaction, strong (R4),</li> </ul>					
_			0	100% 182.9' - Fracture, 15 deg, smooth, undulating, tight	H	few areas of voids, few fossil molds, apparent breccia zones at 182.8-184.0' and 186.0-186.3', color					
- - - 195 -152.5	R32-NQ 5 ft 70%	20	2	186.35' - Fracture, 10 deg, smooth, planar, tight to open up to 1/16" 187.4' - Fracture, 20 deg, smooth, undulating,		of core mainly yellowish gray below 186.0' No Recovery 186.5-187.0'					
			>10	open 187.4-188.15' - Fracture zone, limestone fragments, gravel to cobble-sized	Ħ	<ul> <li>Limestone         <ul> <li>187.0-189.0' - mottled yellowish gray</li> </ul> </li> <li>and light olive gray, (5Y 7/2 and 5Y</li> </ul>					
			>10	188.25' - Fracture, 5 deg, smooth, undulating, — open	囯	<ul> <li>5/2), fine grained, mild to moderate HCl reaction, strong (R4), mottling</li> </ul>	-				
_			NR	188.35' - Fracture, 85 deg, smooth, planar, tight 188.5' - Fracture, 5 deg, smooth, undulating,		resolves into laminated bedding by 188.0', few voids or fossil molds 189.0-192.0' - dusky yellow with thin					
_	197.0			tight 189.0, 189.2' - Fractures (2), 25 deg and 40 deg, rough, undulating, open for 189.0', tight		beds (1/2" thick) of pale olive, (5Y 6/2 with 10Y 6/2), fine grained, moderate to strong HCl reaction,					
_ _			4	for 189.2' 189.4' - Fracture, 20 deg, smooth, undulating,	Ħ	medium strong (R3), voids (<1/16") over 70% of the dusky yellow areas,					
-			>10	open 189.4-190.0' - Fracture zone, limestone fragments, gravel to cobble-sized	Ħ	larger voids (up to 3/8") also present, pale olive areas have few voids, fewer voids overall below 191.0',					
200	R33-NQ 5 ft 48%	0	0	190.35, 190.8' - Fractures (2), 25 deg, rough, undulating, tight for 190.35', open for 190.8'		possible breccia from 189.4-190.0'					
200	1070										



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-15	SHEET	11	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722937.2 N, 457994.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: F. Harrington, M. Griffin

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS: 4.4	11 ft b	gs on (	3/06/07 START: 2/11/2007 END	: 2/20/	/200	D7 LOGGER : A. Teal, R. Gomez	
<05	(%			DISCONTINUITIES		ွှ [	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q t	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND		SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS TEST RESULTS ETC
A313 5.5	202.0	RQE	FRAC	190.7, 191.0' - Fractures (2), 20 deg, rough,	SS		AND ROCK MASS CHARACTERISTICS  Limestone  192.0-195.0' - Same as 189.0-192.0' except with laminated bedding (uneven and irregular), cavities (up to 3/8"x3/8") and some fossil molds from 192.0-193.5' 195.0-195.5' - yellowish gray, (5Y 7/2), fine grained, moderate HCI reaction, medium strong (R3), voids (<1/16") over 5% of surface, fossil molds and larger voids <5% of surface, moderately fossiliferous No Recovery 195.5-197.0' Limestone 197.0-199.4' - Same as 195.0-195.5' except fossil molds and cavities (up to 3/16"x3/8") now cover 10% of core surface No Recovery 199.4-202.0' Bottom of Boring at 202.0 ft bgs on 2/20/2007	Total Depth 202.0' below ground surface



PROJECT NUMBER:	BORING NUMBER:

338884.FL A-16

SHEET 1 OF 10

### **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723075.9 N, 457958.1 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical

WATER LEVELS: 2.5 ft bgs on 4/5/07 START: 4/5/2007 END: 4/8/2007 LOGGER: A. Teal										
STANDARD					SOIL DESCRIPTION			COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	NTERVAL (ft) PENETRATION TEST RESULT		OOU NAME LIGOO OFFICE STATES.					
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	₹	30LI(	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND		
LEV.			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOG	GY	SYMBOLIC LOG	INSTRUMENTATION		
42.7	0.0			(14)	Poorly Graded Sand With Organics (SP)		<u> </u>			
-		1.0	SS-1	0-2-3	0.0-1.0' - black to light brownish gray, (N1 to 5YR moist, loose, no HCl reaction, very fine to fine silic	6/1), -		08:33 Water level at 2.5' below ground - surface		
-	1.5			(5)	$\bigcap$ sand, trace nonplastic fines, 30-35% fine organics	s, / <b>†</b>		3-7/8" tricone bit		
-	1.0				\trace roots	/ 1		-		
_						1				
						]				
_										
_								_		
_						_		_		
5 37.7	5.0				Sandy Lean Clay With Silt (CL-ML)		aП			
31.1			00.0	4-4-2	\ 5.0-5.3' - greenish gray, (5G 6/1), wet, stiff, low to	-		-		
-		0.3	SS-2	(6)	medium plasticity, slow dilatancy, no HCl reaction, 30-35% very fine silica sand, trace roots	·, / <b>-</b>		-		
-	6.5				co do 70 voly into anoa carra, a aco rocc			-		
-						-		-		
-						-		-		
-						-		-		
-						1		-		
-						1		-		
10	10.0					1		_		
32.7					Silt And Limestone (ML) 10.0-10.8' - moderate yellow, (5Y 7/6), wet, very s	ritt				
		0.8	SS-3	11-15-6 (21)	very fine grained, 10-15% sand, nonplastic, rapid	7	Ш	_		
_	11.5			. ,	dilatancy, strong HCl reaction, 50% limestone, lightly live brown, fine to coarse gravel-sized, strong room	ht ck / -		_		
-					(co 5c.,o to course g.a.o. s.zoa, cog.			_		
_						_		-		
-						-		-		
-								-		
-						-		-		
45 -	15.0					-		-		
15 <u> </u>	15.0			39-50/6	Silt And Limestone (ML)		Ш	Set casing to 20'		
-	16.0	1.0	SS-4	(89/12")	15.0-16.0' - Same as 10.0-10.8'			-		
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-16	SHEET	2	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723075.9 N, 457958.1 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER					TART: 4/5/2007 EN	D : 4/8/2007	LOGGE	R : A.	Teal
				STANDARD	SOIL DE	SCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS	0011 114145 11225 5	DOLID 0\(\text{ABO}\) 200 5		SYMBOLIC LOG	DEDTILOF CACINO DOULING SATE
H BE ACE ATIO		RECOVE	ERY (ft)		MOISTURE CONTENT	ROUP SYMBOL, COLOR , RELATIVE DENSITY (	OR	30Li	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
LEV.			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL S	TRUCTURE, MINERALO	OGY	SYME	INSTRUMENTATION
22.7	20.8	0.1	SS-5	50/3.5	_ Limestone Fragments			Ű	
-				(50/3.5")	20.0-20.1' - dark yellowisl rock (R2), voids to 1/16",	n orange, (10YR 6/6), v limestone fragments to	weak /-	1	21.0': End soil sampling switch to rock coring
_					\\1/8"-1/2"	_	/	1	
-					Begin Rock Coring at 21. See the next sheet for the	0 ft bgs e rock core loa		1	1
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-16 SHEET 3 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723075.9 N, 457958.1 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS: 2.5	ft bgs	s on 4/	5/07 START : 4/5/2007 END : 4/	8/200	LOGGER : A. Teal	
<0₽	<u> </u>			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
ELO ON (#	AND RY (9	_	ZES T	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-	21.0		>10	21.0-21.7' - Fracture zone, limestone fragments from gravel to cobble-sized 21.7-22.7' - Fracture zone		Limestone - 21.0-23.2' - grayish orange, (10YR 7/4), medium grained, strong HCl	-
_			>10		Д	reaction, extremely weak to very weak (R0 to R1), highly fossiliferous	Fossils including echinoids, gastropods and brachipods -
-	R1-NQ		0	22.9' - Fracture, 45 deg, rough, planar, open	П	(molds/casts), voids (<1/16") over 70-75% of surface	_
-	5 ft 44%	0			井	- No Recovery 23.2-26.0'	-
_			NR		Ħ	<u>-</u>	_
25 17.7			'\'	_	Ħ	_	R1: 2 minutes
					Ħ	_	- IVI. 2 IIIIIIules
-	26.0			26.0-26.9' - Fracture zone, limestone	Ħ	_ Limestone	-
-			>10	fragments from gravel to cobble-sized	世	<ul> <li>26.0-30.0' - Same as 21.0-23.2' except dusky yellow, (5Y 6/4)</li> </ul>	-
-				07.0.00.01. 5	Ħ	_ except dusky yellow, (31 0/4)	1
-			>10	27.3-28.8' - Fracture zone, fragments up to 1-1/2"	╁	-	1
	R2-NQ 5 ft	25	>10		H		]
_	80%		. 10			_	
-			4	29.4-29.7' - Fracture or mechanical break (4),	Ш	_	-
30 <u> </u>				horizontal and 15 deg, rough, undulating,	Ш	No Recovery 30.0-31.0'	R2: 2 minutes
-	04.0		NR	open	Н	-	-
-	31.0			31.0-32.5' - Fracture zone, limestone	╫	_ Limestone	-
-			>10	fragments from gravel to cobble-sized	Н	<ul> <li>31.0-34.5' - moderate yellow and light olive gray, (5Y 7/6 and 5Y 5/2), light</li> </ul>	-
-			. 40		Ш	olive gray mottling from 32.6-33.4',	11:06 Stopped drilling to
			>10	32.5' - Fracture, 40 deg, rough, stepped, open		<ul> <li>fine grained, strong HCl reaction, weak to medium strong (R2 to R3),</li> </ul>	remix mud -
_	R3-NQ 5 ft	50	2	орен	┍	predominately weak rock, medium strong from 32.3-33.8', voids (<1/16")	Driller's Remark: Lost circulation at 34.0-35.0'
-	70%			33.75' - Fracture, 25 deg, rough, undulating,	Щ	over 80% of surface, fossiliferous	-
-			0	open	Ш	No Recovery 34.5-36.0'	-
35 7.7			NR	_	H		R3: 5 minutes
-	26.0		INIT		世	-	=
-	36.0			36.0-37.2' - Fracture zone, limestone	世	Limestone	
-			>10	fragments from gravel to cobble-sized	Ш	<ul> <li>36.0-40.2' - Same as 31.0-34.5'</li> <li>except light olive gray, (5Y 5/2), color</li> </ul>	
_			1	37.25' - Mechanical break	Ш	transition from above run complete by 37.0', voids <1/16" and abundant	1
			1	37.55' - 25 deg, smooth, undulating, very tight	Ш	larger cavities to 3/16" yielding a	]
_	R4-NQ 5 ft	47	>10	38.3-38.75' - Fracture zone, limestone	Ш	rough surface	]
-	5 ft   4	••		fragments from gravel to cobble-sized 38.9' - 75 deg, rough, planar, very tight	田	-	_
-			0	55.5 - 75 dog, rough, planar, very light	$\Box$	-	-
40 <u> </u>			>10,	40.0-40.7' - Fracture zone, limestone	oxdot	<u></u>	R4: 4 minutes
-	41.0		NR	fragments from gravel to cobble-sized	H	No Recovery 40.2-41.0'	-
-	<del>4</del> 1.U				П		



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	Δ-16	CHEET	4 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723075.9 N, 457958.1 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.5	ft bas	on 4/	/5/07 START : 4/5/2007 END : 4/	<u>8/</u> 20	07 LOGGER : A. Teal	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE ATIO	TH,	D (%)	TUR -00-	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	֓֞֟֝֟֝֟֝֟֟	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT SURF	SORE	RQD	FRACTURES PER FOOT	PLANARITÝ, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS		AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ООШ	0716	Ľ	шп	41.0-42.1' - Fracture zone, fragments up to	0)	Limestone	
-			>10	1-1/2"	F	- 41.0-42.1' - moderate olive brown,	-
_					Ħ	(5Y 4/4), fine grained, strong HCl reaction, extremely weak (R0), friable	=
-					Ħ	- No Recovery 42.1-46.0'	=
_	R5-NQ				Ľ	<u>†</u>	-
_	5 ft 22%	0			Ľ	₫	=
_			NR		₽	+	=
45					Ħ	<u>-</u>	-
45 <u> </u>				_	Ħ	<b>T</b>	R5: 2 minutes
	46.0				口	<b>-</b> [	=
			>10	46.0-46.4' - limestone fragments, silt to fine sand-sized particles	Ы	Limestone 46.0-51.0' - Same as 41.0-42.1'	004
			- 10	Santa-Sizeu partioles	Ь	except very weak (R1), voids <1/16"	SC-1 collected 46.4-47.45'
			1	47.451 5	F	and cavities to 3/16" yielding rough appearance, trace black organic	
				47.45' - Fracture, 35 deg, smooth, undulating, open	F	material 49.0-50.5'	_
_	R6-NQ 5 ft	70	0	48.3, 48.5, 48.7, 49.0' - Mechanical break (4)	Ë	1	_
_	100%	-			Ľ	1	_
_			0		Ľ		-
50 <u> </u>					H		R6: 2 minutes
-			0		Н	+	No. 2 minutes
_	51.0				P	51.0-51.9' - light olive gray, (5Y 5/2),	-
_			0		╆	fine grained, moderate to strong HCl	-
_					╢	reaction, weak (R2), voids <1/16" over 35% of surface, cavities to 3/16"	-
-					╢	- \over <5% of surface, fossiliferous /	-
_	R7-NQ				╢	Silt (ML) 51.9-53.5' - light olive gray, (5Y 5/2),	-
_	5 ft 50%	18			1	strong HCl reaction, carbonate	=
_			NA		111	No Recovery 53.5-56.0'	-
55 55					1		-
-12.3				_	111		R7: 2 minutes
	56.0						
	·					Silt (ML) - 56.0-58.7' - Same as 51.9-53.5'	
_					╢	- 30.0-30.7 - Same as 31.9-33.3	_
			NA			_	_
_						<b> </b> -	_
	R8-NQ 5 ft	10			4	<b> </b> -	_
-	78%	-		58.75-59.0' - Fracture zone, limestone	ľ	Limestone	_
-			3	fragments from gravel to cobble-sized 59.1' - Fracture, 80 deg, rough, planar, open	Þ	58.7-59.9' - moderate olive brown, (5Y 4/4), fine grained, moderate HCl	-
60 <u> </u>				59.25' - Fracture, 30 deg, rough, stepped,	士	reaction, weak (R2), voids <1/16" over 15% of surface, trace cavities to	R8: 3 minutes
-	-		NR	tight 59.4' - 35 deg, rough, undulating, tight	Ь	- 9/16"x3/4" on surface	TO. O HIIIIUGS
-	61.0				F	No Recovery 59.9-61.0'	-



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-16 SHEET 5 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723075.9 N, 457958.1 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.5	ft bgs	s on 4/	/5/07 START : 4/5/2007 END : 4/8	3/20	D7 LOGGER : A. Teal	
300	()			DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-	0.212		NA	- - -	-	Silt (ML) - 61.0-63.0' - Same as 51.9-53.5' except trace organics 61.0-61.3', carbonate material	- - -
-	R9-NQ 5 ft 96%	43	1	63.0' - 60 deg, rough, planar, tight 63.4, 64.3' - Mechanical break (2)		Limestone 63.0-65.8' - moderate olive brown, (5Y 4/4), fine grained, moderate HCl reaction, very weak (R1), voids	SC-2 collected at 63.4- 64.3'
65_ -22.3			0	64.4-65.2' - Mechanical break (>10)	Ħ	- <1/16" over 15% of surface, trace cavities to 9/16"x3/4" on surface	R9: 3 minutes
-	66.0		2 NR	65.3' - Fracture, 15 deg, smooth, undulating, open 65.7' - Fracture, 40 deg, rough, undulating,		No Recovery 65.8-66.0'	-
-			1	open 66.4' - Fracture, 10 deg, rough, undulating, open	E	66.0-70.4' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids	_
_	R10-NQ		2	67' - Fracture, 10 deg, smooth, undulating, tight 67.8' - Fracture, 65 deg, rough, planar, tight 68.1, 68.3' - Fracture (2), 20 deg, rough,	Ħ	<ul> <li>&lt;1/16" on 25% of surface increasing</li> <li>from 68.8', extremely weak (R0) zone from 67.2-67.5', 3/4"x1-3/16" cavity</li> </ul>	- -
_	5 ft 88%	50	3	undulating, open	H	at 70.2', very fossiliferous below 68.5', solution cavity at 68.5-69.0'	=
70 -27.3			1	69.5, 69.8' - 40 deg, rough, undulating, open 70.1' - Fracture, 20 deg, rough, undulating,	Ē	No Recovery 70.4-71.0'	R10: 3 minutes
-	71.0		NR 2	open	Ė	Limestone - 71.0-73.3' - Same as 66.0-70.4'	-
-			>10	71.5' - 85 deg, rough, planar, tight 72.0' - Mechanical break, strong to very strong (R4-R5) 72.25' - Fracture, 20 deg, rough, undulating,		except moderate olive brown, (5Y 4/4)	- - -
-	R11-NQ 5 ft 98%	67	5	open 73.2' - Fracture zone, limestone fragments - from gravel to cobble-sized 73.4, 73.5, 73.7' - Mechanical break		- 73.3-74.4' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), fine grained, moderate to mild	-
75_ -32.3			0	73.95' - 25 deg, smooth, undulating, tight - 74.5' - Mechanical break, medium strong (R3)		HCl reaction, weak (R2), laminated bedding, voids <1/16" over 10%-15% of surface, trace organics	R11: 4 minutes
_	76.0		>10 (NR)	75' - 10 deg, smooth, undulating, tight 75.4-75.9' - Fracture zone, limestone fragments from gravel to cobble-sized		T4.4-75.9' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, very weak (R1), voids <1/16" over <10% of surface, lower strength rock	- -
_			>10	76.75' - Mechanical break 77.0-77.35' - Fracture zone, limestone fragments from gravel to cobble-sized		from 75.5-75.9' No Recovery 75.9-76.0' Limestone	
-	R12-NQ 5 ft	47	>10			76.0-77.2' - Same as 74.4-75.5' 77.2-79.0' - light olive brown, (5Y 5/6), fine grained, moderate HCl reaction, weak to medium strong (R2	- -
- 80	60%		NR	78.75' - 10 deg, rough, undulating, tight 78.9-79.0' - Fracture zone, limestone fragments from gravel to cobble-sized		to R3), voids <1/16" over 40% of surface, cavities up to 3/4"x1-9/16" over 15% of surface, fossiliferous,	-
-37. <del>3</del>	81.0		INFX			trace organics No Recovery 79.0-81.0'	R12: 2 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	A-16	SHEET	6	OF	10	

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723075.9 N, 457958.1 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.5	ft bgs	s on 4/	5/07 START : 4/5/2007 END : 4	/8/200	7 LOGGER : A. Teal	
<b>₹</b> □ <i>≨</i>	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
ELO ON (f	AND (%	_	ZES T	DESCRIPTION	J C	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B FACE	E RU STH, OVEI	R Q D (%)	FOOF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	S O	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				81.1' - 5 deg, smooth, undulating, 1/16" clay		Limestone	
_			>10	infilling, dark brown clay infilling 81.6-82.6' - Fracture zone, limestone	世	<ul> <li>81.0-83.5' - dusky yellow grading to yellowish gray, (5Y 6/4 grading to 5Y</li> </ul>	1
			- 10	fragments from gravel to cobble-sized	$\perp$	7/2), fine grained, moderate to mild  HCl reaction, weak to medium strong	4/6/07 08:04 Water level at
			>10		$\mathbf{L}$	(R2 to R3), voids <1/16" over 25% of	5.4' below ground surface -
	R13-NQ 5 ft	27	1	83.05' - 15 deg, smooth, undulating, open	$\perp$	surface, cavities up to 3/16"x3/8" over <5% of surface	
_	50%	21			F	No Recovery 83.5-86.0'	
_					丰	<del>-</del>	
85 <u> </u>			NR	_	Ħ	_	D12: 5 minutos
-42.5					片	_	R13: 5 minutes
-	86.0			86.0-86.95' - Fracture zone, limestone	廿	_ Limestone	-
-			>10	fragments from gravel to cobble-sized	世	<ul> <li>86.0-89.5' - dusky yellow, (5Y 6/4),</li> </ul>	-
-					$\pm$	fine grained, moderate to strong HCl reaction, medium strong (R3), voids	-
-			4	87.3' - 45 deg, rough, planar, tight 87.5' - 80 deg, rough, planar, open	+	<ul> <li>&lt;1/16" over 35% of surface, cavities to 3/4"x3/4" and fossil molds on 15%</li> </ul>	1
-	R14-NQ			87.55' - 10 deg, rough, undulating	1	of surface, very fossiliferous	
_	5 ft 90%	37	10	87.85' - 50 deg, rough, planar, tight 88.2, 88.5' - 60 deg, rough, planar, tight	$\perp$	<ul> <li>transitioning to moderately fossiliferous at 88.0'</li> </ul>	1
			- 10	88.7' - 20 deg, rough, undulating 89.1-89.4' - Fracture zone, limestone	工	-	1
90			>10	fragments from gravel to cobble-sized		89.5-90.5' - yellowish gray, (5Y 7/2), — fine grained, moderate HCl reaction,	_]
-47.3			0	89.5' - 30 deg, smooth, undulating, open 89.6' - rough, undulating, tight	上	weak (R2), voids <1/16" on 5-10% of	R14: 6 minutes
_	91.0		NR		$\perp$	surface, trace cavities to 3/16", – moderately fossiliferous (molds)	
_			>10	91.0-92.6' - Fracture zone, limestone fragments from gravel to cobble-sized	$\perp$	No Recovery 90.5-91.0' Limestone	
_					+	<ul> <li>91.0-93.0' - dusky yellow, (5Y 6/4),</li> </ul>	-
_			>10		+	fine grained, moderate HCl reaction, weak to medium strong (R2 to R3),	-
-	R15-NQ			92.8' - 25 deg, smooth, undulating, tight	+	<ul> <li>voids &lt;1/16" on 30% of surface, cavities to 3/8"x3/4"</li> </ul>	1
-	5 ft   40%	0			丰	No Recovery 93.0-96.0'	-
-	4070				廿	-	1
95			NR		#	<del>-</del>	
-52.3				-	╁	_	R15: 6 minutes
	96.0				上	_	]
			3	96.25, 96.6, 96.7' - 30 deg, smooth, planar,	片	Limestone - 96.0-97.9' - Same as 91.0-93.0'	]
				very tight	F	except inclusion fragments (to	]
			>10	97.2-97.25' - 45 deg, rough, planar, high	$\coprod$	1-3/16") of yellowish gray	]
-	Diakio			angle fracture zone, very tight 97.9-98.6' - Fracture zone, limestone	F	− 97.9-101.0' - yellowish gray, (5Y 7/2),	
-	R16-NQ 5 ft	65	>10	fragments from gravel to cobble-sized	丰	fine grained, moderate to strong HCl	-
-	100%			98.8' - 60 deg, rough, planar, tight	世	reaction, weak (R2), voids <1/16" on 5% of surface, trace fossil molds to	-
			4	98.95' - 25 deg, rough, undulating, open 99.05, 99.3' - 5 deg, rough, undulating, tight	士	_ 3/16"	-
100_ -57.3				99.2' - 15 deg, rough, undulating, tight – 99.9' - 10 deg, rough, undulating, tight	士	<del>-</del>	R16: 7 minutes
-	101.0		1	100.2' - 60 deg, rough, undulating, tight	$\mathbf{t}$	-	-
	101.0						



PROJECT NUMBER:

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A-16 SHEET 7 OF 10

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723075.9 N, 457958.1 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

				TENT . CIVIE 33 3/N 3 10023, ITIUU TOLATY, INQ LOUIS, HWY C			ORIENTATION: Vertical
WATER	LEVELS : 2.5	ft bg	on 4		8/200		_
≥0≎	- ©			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
N A S	24 20 20 20 20 20 20		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
불병은	12 F. F. F. F. F. F. F. F. F. F. F. F. F.	(%) О	TUR DOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	7 5	MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
투주장	A POS SO SO SO SO SO SO SO SO SO SO SO SO S	Ω	ACT R F	PLANARITY, INFILLING MATERIAL AND	MB(	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	A.	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥ	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
					ш	Limestone	SC-3 collected at 101.0-
-			>10		Н	- 101.0-103.1' - Same as 97.9-101.0'	102.0'
-				102.0-102.2' - Fracture zone, limestone	Ė	-	1 -
-			2	fragments from gravel to cobble-sized	₽	_	-
_				102.65' - 10 deg, rough, undulating, open		_	_
_	R17-NQ 5 ft	62		102.9' - 60 deg, rough, planar, open		Silt (ML)	
	94%	02	NA			103.1-104.2' - moderate olive brown, (5Y 4/4), soft, strong HCl reaction,	
_				-	1Ш	trace organics	1 1
105			0	-		Limestone	1
-62.3				<del>-</del>	₩	— 104.2-105.7' - yellowish gray, (5Y	R17: 6 minutes
-			1	105.4' - 60 deg, rough, planar, tight		7/2), mild to moderate HCl reaction, weak to medium strong (R2 to R3),	-
_	106.0		NR		┢	voids <1/16" on 30% of surface,	_
l _			6	106.0-106.2' - Fracture zone, limestone fragments from gravel to cobble-sized		trace fossil molds	
			U	106.6' - 30 deg, rough, undulating, open	Ш	No Recovery 105.7-106.0' Limestone	
_				107.1-107.8' - 85 deg and vertical, planar,	Ш	106.0-110.0' - Same as 104.2-105.7'	1
-			9	high angle fracture zone, multiple planar	Н	except color grades to mottled dusky	1 1
-	R18-NQ			features open to moderately tight		yellow and light olive gray (5Y 6/4	1 -
-	5 ft	58	3	109 5 110 0' vertical rough planer 15 200/		and 5Y 6/1) by 107.0' then transitions to only dusky yellow by 109.0'	1 -
_	80%			108.5-110.0' - vertical, rough, planar, 15-20% charcoal gray to black, same as 107.1-107.8'	一	-	_
			6		$\vdash$		
110			0				
-67.3				_	Ш	No Recovery 110.0-111.0'	R18: 5 minutes
-	111.0		NR			<u> </u>	1
-	111.0				╁	_ Limestone	Driller's Remark: Boring
-			>10	fragments from gravel to cobble-sized		- 111.0-115.1' - dusky vellow grading	"cave-in" 15.0' from bottom -
_				-	₩	to light olive gray by 112.4' grading to pale olive by 114.5', (5Y 6/4 to 5Y 5/2	(111.0') Advance HW casing from
_			3	112.35' - 60 deg, smooth, planar, tight	ш	- to 10Y 6/2), fine grained, moderate	70.0-110.0'
_				<b>3</b>	Н	HCl reaction, medium strong (R3),	
	R19-NQ		40	112.9' - 10 deg, rough, undulating, tight		voids <1/16" on 35% of surface	
_	5 ft 82%	33	10	-	Ш	-	1
-	0270					-	SC-4 collected at 113.8- 114.5'
			7	114.55-114.7' - Fracture zone, limestone	Н	-	1 114.5
115 <u>-</u> -72.3				fragments from gravel to cobble-sized		<del>-</del>	R19: 4 minutes
-72.5			NR	114.9' - 20 deg, smooth, undulating, open	₽	No Recovery 115.1-116.0'	K 19. 4 IIIIIIules
_	116.0					_	<u> </u>
			<b>\10</b>	116.0-116.3' - Fracture zone, rough,	$\vdash$	<b>Limestone</b> - 116.0-120.3' - Same as 114.5-115.1'	
_			>10	undulating, fragments 1/2"-1-1/2" 116.5, 117.0' - 20 deg, rough, undulating,	Ľ	- 110.0-120.3 - Same as 114.5-115.T	1
I -				open	╙	F	1
-			2	117.35' - 10 deg, rough, undulating, tight	口	-	1
-	R20-NQ					-	1 -
-	5 ft	52	1	118.25' - horizontal, smooth, undulating,	匚	-	1 4
_	86%			black, open to 1/16"	$\vdash$	<u>-</u>	]
I _			1	118.25-118.5' - Mechanical break, limestone fragments from gravel to cobble-sized	П		l J
120			'	119.3-119.8; 120.0-120.3' - 70 deg, rough,	$\vdash$		1
-77.3			1	undulating, black, open to 1/16"			R20: 6 minutes
-	121.0		NR	-	$\vdash$	- No Recovery 120.3-121.0'	1 1
	121.0				Г		<del> </del>
							1



PROJECT NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723075.9 N, 457958.1 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.5	ft bgs	s on 4/	5/07 START : 4/5/2007 END : 4/	8/200	7 LOGGER : A. Teal	
<b>₹</b> □₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
ELO N (f	N, AND RY (9	•	ZES	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	RQ	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				121.1' - 5 deg, smooth, undulating, open	ш	Limestone	
_			3	121.5' - 20 deg, rough, undulating, open	Ш	<ul> <li>121.0-122.3' - Same as 111.0-115.1'</li> <li>except yellowish gray and pale olive</li> </ul>	-
-			>10	121.65' - 20 deg, rough, undulating, open 122.3-122.5' - Fracture zone, limestone		mottling, (5Y 7/2 and 10Y 6/2) - 122.3-122.75' - dusky yellow, (5Y	-
_				fragments from gravel to cobble-sized	Н	6/4), fine grained, moderate to strong	]
	R21-NQ 5 ft	20				HCl reaction, very weak (R1), voids  <1/16" on 25% of surface, cavities	
_	35%	20			Ħ	and fossil molds to 3/8" on 5% of	
_			NR		H	surface - <b>No Recovery 122.75-126.0'</b>	
125_ -82.3				_	H	_	DO4: 6 minutes
-02.5					H	_	R21: 6 minutes
-	126.0				丗	Limestone	-
-			>10	126.2-127.35' - Fracture zone, horizontal and 60 deg, 1/2"-2"	出	- 126.0-126.2' - Same as 122.3-122.8'	-
-				55 55g, 1/2 2	H	_ 126.2-130.2' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction,	-
-			1	127.65-128.1' - Fracture zone, vertical,	H	<ul> <li>medium strong (R3), voids &lt;1/16" on 10% of surface, trace cavities to</li> </ul>	-
_	R22-NQ			rough, undulating, black, open to 1/16",	H	3/16" and fossil molds, zone of light	SC-5 collected at 128.1-
-	5 ft 84%	33	3	127.65' 45 deg 128.2, 128.9' - horizontal, rough, undulating,	ш	<ul> <li>olive gray which has neither voids nor fossils from 127.7 -128.1'</li> </ul>	128.9'
_			- 40	open 129.05' - 10 deg, smooth, undulating, open	Ш		-
130			>10	129.35' - 50 deg, smooth, planar, open	ш		-
-87.3			0	129.6-130.0' - Fracture zone, fragments up to	Ш	No Recovery 130.2-131.0'	R22: 8 minutes
_	131.0		NR		Ш		
_			4		+	<b>Limestone</b> - 131.0-133.9' - yellowish gray, (5Y	_
_				131.7' - 70 deg, rough, planar, tight	+	7/2), fine grained, mild to moderate HCl reaction, medium strong (R3),	_
_			4	131.7-132.4' - Fracture zone, 70 deg and vertical, rough, planar, tight to open	H	<ul><li>voids &lt;1/16" on 25%, cavities to</li></ul>	-
-	R23-NQ				H	3/16" and fossil molds on <5% of surface, moderately fossiliferous	-
-	5 ft	50	3		Ħ	-	-
-	58%			133.8' - 10 deg, smooth, undulating, open	丗	No Recovery 133.9-136.0'	-
- 135					Ш	_	-
-92.3			NR	<del>-</del>	Ш		R23: 5 minutes
-	136.0				Ш	-	
			<b>&gt;10</b>	136.0-136.5' - Fracture zone, rough,	H	Limestone 136.0-139.75' - grayish yellow with	1
			>10	undulating, fragments 1/16"-2"	Щ	pale olive from 138.8-139.5', (5Y 8/4	SC-6 collected at 136.5- 137.4' -
			5		川	with 10Y 6/2), fine grained, strong HCl reaction, weak (R2), voids	107.7
_				137.75-138.4' - Fractures or mechanical	Щ	<1/16" on 35% of surface, fossil	
_	R24-NQ 5 ft	38	3	break, 5 deg, smooth, planar, tight	Ш	molds to 3/16"x3/8" from - 138.4-139.8', moderately	
_	75%			138.75' - 10 deg, rough, undulating, open	Ш	fossiliferous	_
_			3	130.5' 15 deg rough undulating apon	H	_	-
140_ -97.3				139.5' - 15 deg, rough, undulating, open 139.75' - 25 deg, smooth, undulating, open —	H	No Recovery 139.75-141.0'	R24: 5 minutes
-			NR		$\Box$	_	- TAZ-4. O IIIIIIUIUU
-	141.0				+		+



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-16 SHEET 9 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723075.9 N, 457958.1 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.5	ft bgs	s on 4/	5/07 START : 4/5/2007 END : 4	/8/200	LOGGER : A. Teal	
⊋Q⊋	(%			DISCONTINUITIES	)S	LITHOLOGY	COMMENTS
N AN	ANG RY (6	_	ZES T	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
FACE	E RU GTH, OVE	(%) O	CTUF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	S O	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				141.2' - 10 deg, smooth, undulating, open		Limestone	
-			10	141.35' - 15 deg, smooth, undulating, open	世	<ul> <li>141.0-141.8' - yellowish gray, (5Y 7/2), fine grained, strong HCl</li> </ul>	1
			>10	141.5' - 30 deg, smooth, undulating, open 141.75' - 20 deg, smooth, undulating, open	$\blacksquare$	reaction, weak (R2), voids <1/16" on 30% of surface, cavities and fossil	]
			/10	141.76-142.4' - Fracture zone, black, irregular fragments to 1-1/2"	ightharpoons	molds up to 3/16" on 5% of surface	
	R25-NQ 5 ft	0	6	142.6-143.7 - Fracture (6), 20 deg and 30	$\vdash$	141.8-142.6' - yellowish gray, (5Y - 7/2), fine grained, mild HCl reaction,	
_	56%	U		deg, rough, undulating, open	厈	medium strong to strong (R3 to R4),	
_					上	voids <1/16" on 5% of surface - 142.6-143.8' - light olive gray, (5Y 5/2	
145_			NR	_	上	with 5Y 7/2), 10% yellowish gray mottling, fine grained, strong HCl	
-102.3 -					世	<ul><li>reaction, strong (R4), voids &lt;1/16" on</li></ul>	R25: 5 minutes
-	146.0			146.0-147.3' - Fracture zone, dark, limestone	Ł	25% of surface, trace cavities and fossil (molds) to 9/16"	-
-			>10	fragments from gravel to cobble-sized	+	No Recovery 143.8-146.0'	-
-			>10		+	<b>Limestone</b> 146.0-147.5' - yellowish gray, (5Y 7/2	Set casing to 150.0' due to
-			/10		世	<ul> <li>and 5Y 5/2), light olive gray mottling, fine grained, mild HCl reaction,</li> </ul>	cave-in on last run; stop -
-	R26-NQ				世	strong (R4), trace voids <1/16",	coring at 151.0' for the day
-	5 ft 30%	0			士	cavities 1/16"x1/16" and fossil molds No Recovery 147.5-151.0'	-
_	30%		NR		╁		-
150					+	-	-
-107.3				_	Ħ	_	R26: 10 minutes
-	151.0				Ħ	=	-
_			-10	151.0-151.5' - Fracture zone, subangular	1	Limestone	1
			>10	fragments predominately 1"-1/2"		<ul> <li>151.0-155.5' - yellowish gray, (5Y 7/2 with 5Y 5/2), light olive gray mottling</li> </ul>	
			5	152' - 25 deg, smooth, undulating, open 152.3' - Mechanical break	ho	from 152.5-153.8', mild to moderate  HCl reaction, medium strong (R3),	Water level at 5.3' below ground surface
l _			J	152.45-153.2' - Fracture zone, rough,	╨	laminar bedding below 153.5'	ground surface
_	R27-NQ 5 ft	48	>10	undulating, dark, staining on vertical fracture	₽	<del>-</del>	
-	90%	.•		153.7-154.2' - Fracture zone, fragments	厂	-	
-			>10	1/16"-1/2" 154.4, 154.7, 155.05' - Mechanical break	厂	-	
155_ -112.3					上	<u> </u>	R27: 10 minutes
			4 NR	155.25' - 15 deg, smooth, planar, open,	士	No Recovery 155.5-156.0'	1.27. TO Hilliaids
-	156.0		INIX	solution cavity 155.3' - 10 deg, smooth, planar, tight	士	Limestone	-
-			>10	155.4' - 15 deg, smooth, planar, tight 156.0-156.4' - Fracture zone, rough,	+	- 156.0-159.0' - vellowish grav	-
-				undulating, small fragments 1/16"- 1-1/2"	F	transitions to dusky yellow below 158.0', (5Y 7/2 to 5Y 6/4), fine	-
-			1	157.65' - Mechanical break	厈	<ul> <li>grained, mild HCl reaction, medium strong (R3), laminated bedding,</li> </ul>	
-	R28-NQ			157.9' - 20 deg, smooth, undulating, open	‡	voids <1/16" on 5% of surface,	
-	5 ft 60%	47	>10	158.7-158.9' - Fracture zone	#	<ul> <li>cavities and fossil molds to 3/16" on</li> <li>&lt;5% of surface (predominantly on</li> </ul>	1
-					1	lighter colored laminations), increased voids and fossil	1
160			NID		$\mathbb{H}$	abundance below 158.0'	1
-117.3			NR	_	$\mathbb{H}$	No Recovery 159.0-161.0'	R28: 9 minutes
	161.0				oxdot		
Щ							L



PROJECT NUMBER:

33884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723075.9 N, 457958.1 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.5	ft bg	s on 4	/5/07 START : 4/5/2007 END : 4/	8/200	7 LOGGER : A. Teal	
≥ ∩ ⊕	6)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE	E RU	(%) Q	FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
LEV EV	SORE	RQD	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	₹	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
000	016	ш.	шш		10,	Limestone	
-			1	404.051. M. J	Ħ	<ul> <li>161.0-162.9' - dusky yellow with</li> </ul>	-
-				161.65' - Mechanical break 161.8' - Fracture or mechanical break,	Ħ	moderate olive brown from 161.8-162.7', (5Y 6/4 with 5Y 4/4),	-
-			6	horizontal, smooth, planar, open	世	<ul> <li>fine grained, mild HCl reaction,</li> </ul>	-
-	R29-NQ			162.1' - 20 deg, rough, undulating, open, solution cavity	₩	medium strong (R3), thin bedding, voids <1/16" on 50% of surface,	-
-	5 ft	37	>10	162.25' - Fracture or mechanical break, horizontal, smooth, planar, open	╨	<ul> <li>cavities up to 3/8"x3/4" and fossil</li> </ul>	-
-	86%			162.35' - Mechanical break	╁	molds on <5% of surface, evenly distributed thin (1/2"-1") bedding	-
405			>10	162.7' - 20 deg, rough, undulating, open 162.9-163.5' - Fracture zone	世	<ul> <li>162.9-165.3' - yellowish gray with zone of dusky yellow and light olive</li> </ul>	-
165_ -122.3			1	163.5-164.2' - Fracture zone, 45 deg and 75	╁	from 164.6-165.3', (5Y 7/2 with 5Y	R29: 4 minutes
-			NR	deg 164.2-164.6' - Fracture zone	F	<ul> <li>6/4 and 5Y 5/2), fine grained, mild</li> <li>HCl reaction, medium strong (R3),</li> </ul>	-
-	166.0			164.9,164.95, 165.05' - 10 deg, smooth,	茾	laminar bedding from 164.2-164.6',	-
-			1	planar, tight 166.35, 167.7' - 40 deg, rough, planar, tight	Ħ	trace voids <1/16" No Recovery 165.3-166.0'	-
-					世	Limestone	-
-			2		₩	L 166.0-170.5' - moderate yellowish brown, (10YR 5/4), fine grained, mild	-
-	R30-NQ			167.8' - 55 deg, rough, planar, tight 167.95' - Mechanical break	F	HCl reaction, medium strong (R3),	SC-7 collected at 167.95-
-	5 ft 90%	77	>10		ш	Laminar bedding from 167.8-169.4', voids <1/16" on 20% of surface from	168.75' –
-				168.75-169.2' - Fracture zone, dark, staining on vertical fractures	ш	166.0-168.0', <5% below 168.0', cavities 3/8"x3/8" and fossil molds on	-
170			2	169.7' - Mechanical break	Ъ	5% of surface from 166.4-168.0'	-
-127.3			1	169.9' - 30 deg, smooth, undulating, tight	╁	_	R30: 6 minutes
-	171.0		NR	170.4' - horizontal, smooth, planar, open	H	No Recovery 170.5-171.0'	_
			2		F	Limestone - 171.0-171.5' - moderate yellowish	
				171.45' - 5 deg, smooth, planar, tight 171.5' - 5 deg, smooth, planar, open	F	brown, (10YR 5/4), fine grained, mild	
l _			5	172.2' - 5 deg, smooth, undulating, open	H	HCl reaction, medium strong to strong (R3 to R4), voids <1/16" on	_
_				172.4' - 85 deg, rough, planar, tight 172.55-173.9' - Fracture zone, 45 deg and 75	H	5% of surface	_
_	R31-NQ 5 ft	73	>10	deg, smooth, planar, black staining, tight	F	171.5-172.2' - yellowish gray, (5Y - 7/2), mild HCl reaction, strong (R4),	_
-	100%				F	laminated bedding at 5-10 deg.	SC-8 collected at 173.9-
-			0		口	172.2-176.0' - yellowish gray to - dusky yellow, (5Y 7/2 to 5Y 6/4), mild	175.0' _
175_ -132.3					上	HCl reaction, medium strong (R3), laminated bedding 175.0-176.0',	R31: 6 minutes
- 102.5			4	175.1, 175.2, 175.35' - 10 deg, smooth, undulating, open, brownish staining at 175.2'	士	voids <1/16" on <5% of surface	15:07 End boring at 176.0',
-	176.0			5, 5,5	╆	Bottom of Boring at 176.0 ft bgs on	met recovery and RQD
-	-				-	- 4/8/2007	\requirements
-					+	-	-
-					1	-	-
-					1	-	-
-					1	-	-
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-17	SHEET	1	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit

						Ty, auto nammer, AVVJ 1005,		) · A	Tool N. Jorzypiecki M. Faurete
WATER	LEVELS	: 2.5 ft bo	JS 011 4/10		START : 4/9/2007	END : 4/18/2007 SOIL DESCRIPTION	LUGGER	( . A.	Teal, N. Jarzyniecki, M. Faurote  COMMENTS
≷Ç€	CAMPIE	INTERVA	I (f4)	STANDARD PENETRATION		GOIL DEGORIF HON		90	OliviiviLivio
DN (	SAMPLE		` ,	TEST RESULTS	SOIL NAM	IE, USCS GROUP SYMBOL,	COLOR.	IC L	DEPTH OF CASING, DRILLING RATE,
H B		RECOVE			MOISTURE	E CONTENT, RELATIVE DEI	NSITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTEN	ICY, SOIL STRUCTURE, MIN	NERALOGY	SYMBOLIC LOG	INSTRUMENTATION
42.3	0.0			(14)	Poorly Graded	d Sand With Organics (SP	P)		4/9/07, 17:20 no water encountered
-		1.2	SS-1	1-3-6	0.0-1.2' - browr	nish black to pale brown, (	5YR 2/1 to -		-
-		1.2	33-1	(9)	□ 5YR 5/2), mois □ HCl reaction u	st, loose, very fine to fine g up to 30% fine organics and	rained, no d roots silica  –		- 04/10/07 08:01: Begin drilling for the day
-	1.5				sand	.p to 00 /00 0. ga00 a	-	1	-
-							-		-
-							-		Water level: 2.5' below ground surface,
_							-		08:01 on 4/10/07
-							_	.	_
_							-		_
_							-		_
5	5.0								
37.3				1-1-1	Silty Sand (SN 5.0-5.9' - mode	<b>/l)</b> erate yellowish brown, (10\	(R 5/4) wet -		_
_		1.2	SS-2	(2)	very loose, ver	ry fine to fine grained, no H			_
	6.5			. ,	Lean Clay Witl	c fines, silica sand	/г_	///	
					5.9-6.2' - areen	nish gray to dark vellowish	orange to		
					pale purple, (50	G 6/1 to 10YR 6/6 to 5P 6/	2), wet, very		
						o high plasticity, no dilatan 5% very fine to fine grained			
					,	, ,			
-							-		_
-							-	1	1
10	10.0						-	1	1
32.3				5-10-5		ne Fragments With Sand		Ш	7
-	11.0	1.0	SS-3	(15)	10.0-11.5' - whi	nite to yellowish gray, (N9, se, strong HCl reaction, fine	5Y 9/1), wet,     - to coarse		-
_	11.0				ດ gravel, 20% lov	w plastic fines, grained pre	edominantly /		1
-					\fine to medium	sand, all carbonate		1	Driller's Remark: Slight mud loss at 12.0'
-							-	1	below ground surface -
-							-	1	-
-							-	1	
-							-		
-							-		
,	45.0						-		-
15 <u> </u>	15.0				Silt (ML)			$\parallel \parallel \parallel \parallel$	-
-		1.3	SS-4	34-39-42	15.0-16.3' - gra	ayish yellow, (5Y 8/4), mois	st to wet,	$\  \ $	
-	46 -	1.3	JJ-4	(81)		ic, rapid dilatancy, modera ery fine to medium sand, tr		$\  \  \ $	-
-	16.5					black minerals, all carbon			08:39 set casing to 20.0'
-							-		-
-							-		-
-							-		-
-							-		
_							-		
-							_		_
20									



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-17	SHEET	2	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 2.5 ft bo		0/07 5	START : 4/9/2007	END : 4/18/200	7 LOG	GER	: A.	Teal, N. Jarzyniecki, M. Faurote
\				STANDARD		SOIL DESCRIPTION	l		Ģ	COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS	COU NAM	AE LICOS ODOLID OVA			СГО	DEDTIL OF CACING DRILLING DATE
H BE ACE ATIO		RECOVE	RY (ft)		MOISTURI	ME, USCS GROUP SYM E CONTENT, RELATIVE	DENSITY OR		30LI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTEN	ICY, SOIL STRUCTURE	, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
22.3	20.0	0.3	SS-5	50/3	⊐ Sandy Silt (M	L)		$\neg$	Ш	
-	20.2			(50/3")	I ∖nonplastic vei	ayish orange, (10YR 7 ry rapid dilatancy, mild	to moderate HC	: /1		-
-					reaction, 25-30	0% fine to medium sar	nd, two fine	`/1		_
-	]				gravei-sized iii Begin Rock C	mestone fragments, all	carbonate	-/ 1		_
					See the next s	oring at 20.3 ft bgs sheet for the rock core	log			
										_
_										_
_										_
_	_							4		-
25 <u> </u>								_		
-	-							-		-
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-	-							-		-
-	-									-
										_
30										
12.3								_		-
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1										



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-17 SHEET 3 OF 14

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.5	ft bg	s on 4/	10/07 START : 4/9/2007 END : 4/	18/20	007	LOGGER : A. Teal, N. Jarzynieck	i, M. Faurote
				DISCONTINUITIES	ß		LITHOLOGY	COMMENTS
ANE (#	AND ≪AND		ES	DESCRIPTION	350		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
LEV SEPT	SORE	R O	FRAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME		AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	NQ-1	0	NA		111	╁	Silt (ML)	_
_	21.0 0.8 ft 75%	U	NR,		Ш	L	20.3-20.85' - Same as 15.0-16.3'	_
_	[ (,		0		H	╁╵	except strong HCl reaction No Recovery 20.85-21.0'	=
-	.				H	╁	Limestone	-
-			0		₽	╁	21.0-24.1' - grayish orange, (10YR 7/4), medium to fine grained, mild	-
-	R2-NQ		0		П	7	HCl reaction, extremely weak to very weak (R0 to R1), voids <1/16" on	=
-	5 ft	0	0		H	1	90-95% of surface, trace rounded to	-
-	62%		$\sqcup$		世	╊	subrounded white casts, at 22.55' sandy clay lens, greenish gray, 0.1'	Casing advanced to 25.0'
-					廿	t	thick, 22.56-22.9' trace linear white bedding, moderately to very	-
25 <u> </u>			NR	_	╁	╁	fossiliferous	
-	26.0				╁	ł	No Recovery 24.1-26.0'	=
-	20.0			26.0-27.0' - Fracture zone or mechanical	F	╁	Limestone	-
-			1	break, 0-70 deg, rough, undulating, open to 3/16"	F	Ŧ	26.0-29.4' - grayish orange, (10YR 7/4), fine grained, moderate HCl	-
-			>10	27.0-29.4' - Fracture zone, silt and rock	Ħ	Ŧ	reaction, extremely weak to very weak (R0 to R1), voids <1/16" on	_
			/10	fragments to 1-1/2"	Ħ	1	25% of surface, zones of silt	
_	R3-NQ 5 ft	0	>10		Ë	1	27.0'-29.4', 6" thick	_
_	90%	Ů	- 10		H	╁		_
_	.		>10	29.4-30.5' - Fracture zone, sand to	H	╁	29.4-30.5' - grayish orange, (10YR	=
30 <u> </u>				cobble-sized limestone fragments	$\vdash$	╄	. 7/4), fine grained, moderate HCl	
12.3	.		>10		П	1	reaction, medium strong (R3), few voids <1/16"	-
-	31.0		NR		H	1	No Recovery 30.5-31.0' Limestone	-
-			>10		扛	╊	31.0-34.2' - gravish orange with olive	-
-				31.9-34.2' - Fracture zone, 0-65 deg, rough,	世	╁	gray mottling over 60-70% of surface, (10YR 7/4, 5Y 4/1), very fine	-
-	-		>10	undulating, lighter coloration (grayish orange) up to 1/8" wide along 65 deg fracture at	$\Box$	t	to fine grained, mild HCl reaction,	=
-	R4-NQ		>10	33.0-33.3'	Ь	$^{\dagger}$	weak (R2), predominately olive gray by 34.0', grayish orange material	-
-	5 ft 64%	18	0		H	╁	becoming associated with casts/molds, moderately	=
-			dash		H	ł	fossiliferous, voids vary from 10-15%	<u>-</u>
35					H	Ŧ	up to 50% in matrix No Recovery 34.2-36.0'	-
7.3	]		NR		];	E	<del>-</del>	
	36.0				Ħ	1		
_			>10	36.0-36.5' - Fracture zone, 0-70 deg, rough, undulating, grayish orange coloration on most	H	1	<b>Limestone</b> 36.0-38.0' - olive gray, (5Y 4/1), fine	
_				surfaces, rock fragments to 2"	Ľ	╁	grained, moderate HCl reaction,	_
-			1	36.5-36.7' - Fracture, 65 deg, rough, undulating, tight	H	╁	voids <1/16" on 20% of surface, very fossiliferous, few cavities to 3/16"	_
-	DE NO		$\vdash \vdash$	37.6' - Fracture, 60 deg, rough, planar, tight 38.0-38.8' - Fracture zone, smooth, planar to	H	╀	(molds) 38.0-38.8' - moderate yellowish	-
-	R5-NQ 5 ft	27	>10	undulating, fragments <1"	口	1	brown, (10YR 5/4), fine grained,	=
-	56%				扛	+	moderate HCl reaction, extremely weak (R0), friable, trace organics	-
					口	╁	No Recovery 38.8-41.0'	-
40 <u> </u>			NR	_	b	Ł	-	



PROJECT NUMBER:

338884.FL

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

DISCONITINI IITIES	. Jarzyniecki, M. Faurote  COMMENTS
DESCRIPTION  O ROCK TYPE, COLOR,	
DISCONTINUITIES  ON A CHARACTERISTICS  DISCONTINUITIES  ON A CHARACTERISTICS  ON A CHARACTERISTICS  ON A CHARACTERISTICS  ON A CHARACTERISTICS	
41.0  41.0-44.4' - Fracture zone, 20-30 deg, rough to smooth, undulating, fragments predominately 1/2" up to 2"  Limestone 41.0-42.3' - pale yellowish brov (10YR 6/2), fine grained, mode HCI reaction, very weak (R1), - <1/16" on 50% of surface, moderately fossiliferous, trace organics 5 ft 0 >10 >10 >10   -	erate _ voids
except extremely weak (R0), 42.3-42.5' seam of sandy lean No Recovery 44.4-46.0'	n clay - - - -
46.0-47.7' - Fractures (8), 20 deg, rough, undulating, to smooth and undulating, face angles parallel, open to 1/16"  47.9' - Fracture, horizontal, smooth, undulating, open to 3/16"  47.9' - Fracture, horizontal, smooth, undulating, open to 3/16"  48.2-48.6' - pale yellowish brow (10YR 6/2), fine grained, mode friable, trace organics  48.2-48.6' - pale yellowish brow (10YR 6/2), fine grained, mode HCI reaction, very weak (R1), vough, undulating 48.6-49.4' - Fracture zone, rough, undulating, volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction, very weak (R1), volume and the provided HCI reaction and the provided HCI reac	erate (R0),
Tock fragments to 1"   laminations of organic materia	2' -
51.3' - Fracture, 20 deg, smooth, undulating, open to 3/16" 51.4-52.0' - Fracture zone, 0-90 deg, rough, undulating, to smooth and undulating, fragments <3/16"-1-1/2" 52.1, 53.4, 53.6, 54.0, 54.9' - Mechanical break (5)  R8-NQ 5 ft 35 1	5' - 6' -
90%  52.2, 52.3, 52.5, 52.8' - Fracture (4), 20 deg, rough, undulating, to smooth and planar, fractures non-parallel, open to 1/8"  5512.7  1 NR  56.0  No Recovery 55.5-56.0'	- - - -
3/16" 55.4' - Fracture, 20 deg, rough, planar, open to 1/16" 56.1' - Fracture, horizontal, smooth, undulating, open to 1/16" 56.3, 56.5' - Fractures (2), 20-40 deg, smooth, undulating, open to 3/16" 57.2' - Fracture, 0-20 deg, 20 deg on upper surface, 0 deg on lower surface, open 57.5-58.1' - Fracture zone, 0-65 deg, smooth, undulating, trace silt and/or clay sized infilling, black staining on 65 deg fracture	Casing advanced to 60.0'  Y 5/2), n, g, ace, om B" some
-17.7   >10) faces, fragments from 1/2"-2"   -17.7	



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

				140/07 - CTART : 4/0/2007 - FNR : 4/		07 LOCCED A Tool N. Jorganical	i M. Faurete
	LEVELS : 2.5	πbg	s on 4	<u>/10/07 START : 4/9/2007 END : 4/</u> DISCONTINUITIES		07 LOGGER : A. Teal, N. Jarzynieck LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		m	DESCRIPTION	SYMBOLIC LOG		002
BEL ION	L'A'N	(9)	JRES OT	DESCRIPTION	딕	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
L H H A	A TOO	(%) Q	CTL	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BOI	WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR	REC REC	a Q	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
			NR	58.75' - Fracture, 25 deg, rough, planar, tight		- No Recovery 60.2-61.0'	_
_	61.0		INIX	58.9-59.0' - Fracture, horizontal, 2 fragments,	╁	_	_
_			2	open 59.2-59.5' - Fracture zone, 70 deg, black		<b>Limestone</b> - 61.0-62.7' - Same as 57.5-60.2'	_
l -				staining on face, closed		except intervals of laminated	_
1 _			8	59.7' - Fracture, 35 deg, closed 59.8-60.2' - Fracture zone, 0-65 deg, rough,	$oldsymbol{\perp}$	bedding, voids <1/16" and cavities up to 3/8" diameter from 61.5-62.7	_
l _				undulating, dark staining	ш	62.7-63.9' - light olive gray, (5Y 5/2),	_
	R10-NC 5 ft	30	>10	61.1-61.3 <sup>ī</sup> - Fracture, 80 deg, dark staining, tight		fine grained, moderate HCl reaction,	
	58%	30		61.5' - Fracture, 45 deg, smooth, planar, tight	$\vdash$	medium strong (R3), voids <1/16" on 25% of surface, very fossiliferous,	
				62.05' - Fracture, 10 deg, smooth, undulating, tight	Ė	molds up to 3/8"diameter	1
65			NR	62.3' - Fracture, 30 deg, fracture not	Ľ	- No Recovery 63.9-66.0'	1
-22.7			INIX	completely through core 62.65' - Fracture, 15 deg, smooth, undulating,	╨	_	
_	66.0			tight	Ш	-	1
-	00.0			62.8-63.0' - Fracture zone, smooth to rough, undulating, fragments 3/8"-1"	ш	Limestone	1
-			>10	63.3' - Fracture, 10 deg, smooth, undulating,	1	66.0-69.5' - moderate olive brown to light olive gray, (5Y 4/4 to 5Y 5/2),	SC-1 collected at 66.4-
-				loose 63.3-63.9' - Fracture zone, 0-90 deg, rough,	F	fine grained, mild HCl reaction, weak	67.6'
-			>10	undulating, dark staining, fragments	Ħ	<ul> <li>to medium strong (R2 to R3), voids</li> <li>&lt;1/16" on 15% surface, cavities to</li> </ul>	1
-	R11-NC			<1/16"-2-1/2", staining on one 45 deg face	╁	3/8" over <5%, moderately	-
-	5 ft 100%	50	>10	66.0-66.4' - Fracture zone, smooth, undulating, some dark staining, fragments to	ш	<ul> <li>fossiliferous, trace organics</li> </ul>	-
-	100 /0			3/8"	╁	-	-
70 -			>10	67.6-68.9' - Fracture zone, 0-90 deg, rough, undulating, fragments <1/16"-2", some	t	69.5-71.0' - moderate yellowish	-
70 -27.7				organic material on some fragment faces —	╁	— brown, (10YR 5/4), fine grained, mild	-
-	74.0		>10	69.15' - Fracture, 75 deg, rough, planar, tight 69.4-70.4' - Fracture zone, similar to	Ė	to moderate HCl reaction, weak (R2), laminated bedding, inclined 30 deg,	-
-	71.0			67.6-68.9'	t	- organics present along bedding,	SC-2 collected at 71.0-
-			1		₩	moderately fossiliferous at 70.5-71.0' 71.0-76.0' - Same as 69.5-71.0'	71.9' -
-				71.9' - Fracture, horizontal, smooth,	Н	- except voids <1/16" on 5% of	-
-			1	undulating, tight 72.35' - Fracture, 50 deg, smooth, planar,	仜	surface, laminated bedding with 30-45 deg angles, more pronounced	-
-	R12-NC			loose	$\perp$	-	-
-	5 ft	100	0	72.8' - Mechanical break 73.1, 73.6, 75.5' - Mechanical break (3)	+	-	-
-	100%			73.1, 73.0, 73.3 - Weditalileal bleak (3)	F	-	-
-			0			-	-
75_ -32.7				_	₩	_	
-			0		F	-	
-	76.0				仜		-
-			0		$\pm$	<ul> <li>brown, (10YR 5/4), fine grained,</li> </ul>	-
-				76.6' - Mechanical break	F	moderate HCl reaction, very weak	-
_			3	77.0' - Fracture, 55 deg, smooth, planar, tight	片	(R1), thinly laminated (1/4"), inclined 5-10 deg, voids <1/16" on 15% of	_
_	5			77.65' - Fracture, 20 deg, rough, undulating,	片	surface and trace organics predominately along bedding, trace	
-	R13-NQ 5 ft	33	3	loose 77.9' - Fracture, 30 deg, smooth, undulating,	oxdot	<ul><li>1/16"-1/8" gray clasts</li></ul>	
-	52%			tight	I	No Recovery 78.6-81.0'	0
-				78.3' - Fracture, 25 deg, smooth, undulating, tight	上	  -	Casing advanced to 80.0' end of day 4/10/07 at
80			NR	78.4' - Fracture, horizontal, smooth,	$\vdash$		101.0'
-37.7				undulating, loose	F		
					-	-	-



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.5	ft bg	s on 4/	/10/07 START : 4/9/2007 END : 4/	18/20	D7 LOGGER : A. Teal, N. Jarzynieck	i, M. Faurote
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-				78.5' - Fracture, 45 deg, smooth, undulating,	Ė		-
-	81.0		>10	loose 81.5-81.9' - Fracture zone, rough, undulating,	Ħ	Limestone - 81.0-81.5' - grayish orange, (10YR	-
-			>10	fragments <3/16-1-1/2" 82.2' - Mechanical break		7/4), fine grained, moderate HCI reaction, very weak to weak (R1 to R2), voids <1/16" on 25% of surface	-
-	R14-NQ 5 ft	20	>10	82.5-82.8' - Fracture zone, same as 81.5-81.9' 82.8' - Fracture, 60 deg, rough, planar, loose	Ħ	81.5-83.75' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/2), fine grained, moderate HCl	-
85_ -42.7	55%		NR	83.1' - Fracture, 40 deg, rough, undulating, tight 83.35-83.75' - Fracture zone, same as 81.5-81.9'		reaction, medium strong (R3), voids <1/16" on 25% of surface, cavities to 3/8"x3/8" over 10% from 81.9-82.8', moderately fossiliferous No Recovery 83.75-86.0'	- - -
-	86.0		3		Ħ	Limestone - 86.0-90.9' - yellowish gray, (5Y 7/2),	_
-			10	86.75' - Fracture, 45 deg, rough, planar, tight 86.95-87.3' - Fracture zone, 0-60 deg, smooth, undulating, fragments 3/8"-1-1/2"	E	fine grained, mild HCl reaction, medium strong (R3), voids <1/16" on 25-30% of surface, trace cavities to	_
-	R15-NQ 5 ft	80	2	87.75, 88.2' - Fractures (2), 20-30 deg, smooth, undulating, tight		3/16" except 5% at 89.4-90.9', very fossiliferous from 89.4-90.9'	SC-3 collected at 88.2-
-	98%		0	89.35' - Fracture, 20 deg, rough, undulating,	Ħ	-	89.35'
90 <u> </u>			2	loose, clay seam 1/32" thick	Ħ	_	
-	91.0		NR / >10	90.5' - Fracture, 30 deg, smooth, undulating, tight, clay seam 1/4" thick 90.6' - Fracture, 15 deg, smooth, undulating, loose		No Recovery 90.9-91.0'	_ _
-			1	91.0-91.7' - Fracture zone, 0-90 deg, fragments <3/8"-1-1/2", clay films 92.5' - Mechanical break		91.0-91.5' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, medium strong to strong (R3 to R4)	- -
-	R16-NQ 5 ft	25	>10	92.9' - Fracture, 60 deg, rough, planar, open to 1/16" 93.15' - Fracture, 80 deg, rough, planar, tight	Ħ	91.5-94.2' - moderate yellowish brown, (10YR 4/2), fine grained, moderate HCI reaction, laminated	-
-	64%		>10	93.5-94.2' - Fracture, 75 deg, smooth, planar, tight tight 93.5-94.2' - Fracture zone, 0-70 deg, smooth,		organics 1/16" thick at 91.7' and 92.4' with trace laminated organics elsewhere, voids <1/16" on 25% of	-
95 <u> </u>	06.0		NR	undulating, fragments 3/8"-2-1/2"	Ė	surface,few larger cavities along     apparent healed fracture planes     No Recovery 94.2-96.0'	
-	96.0		>10	96.0-98.0' - Fracture zone, smooth to rough, undulating, fragments 3/8"-3"		Limestone 96.0-98.0' - grayish orange and light gray, (10YR 7/4 and N6), fine	-
-			>10		분	grained, mild to moderate HCl reaction, strong (R4), few voids <1/1/16" over 20% from 97.0-97.5"	-
-	R17-NQ 5 ft 40%	0			Ħ	No Recovery 98.0-101.0'	-
100	1 11,5		NR			-	-
<u>-57.7</u>					╬		Casing advanced to 100.0'



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.5	ft bg	s on 4/	110/07 START : 4/9/2007 END : 4/	18/20	07 LOGGER : A. Teal, N. Jarzynieci	ki, M. Faurote			
≥0.≘	(%)			DISCONTINUITIES	ار او	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	3 Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
-	101.0			101.0.101.25' Fracture Zono to 00 dos	Ť	Limentone	-			
-			>10	101.0-101.35' - Fracture zone, to 90 deg, fragments 3/8"-2-1/2"		Limestone  - 101.0-106.0' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, medium strong (R3),	-			
-	D40 NO		1	102.15' - Fracture, 60 deg, rough, planar to undulating, tight	Ħ	voids <1/16" on 15% of surface, trace cavities to 3/8" predominately fossil molds and casts, very	Water level at 1.9' below ground surface - SC-4 collected at 102.15-103.5'			
-	R18-NQ 5 ft 100%	82			1	103.5' - Fracture, 50 deg, smooth, undulating to planar, tight		fossiliferous	-	
105 -62.7				1	104.0, 105.4' - Fractures (2), 15 deg, rough, undulating, tight		-	-		
-	106.0		2	105.6' - Fracture, 70 deg, smooth, planar, tight		- - 106.0-111.0' - Same as 101.0-106.0'	-			
-		77				3	106.1-106.4' - Fracture, 60 deg, rough, undulating, tight to open to 1/16" 106.4-106.7' - Fracture, apparent healed	Ē	except olive gray mottling (5Y 4/1), at 107.0' laminated bedding from 109.6-110.2' inclined 40 deg	-
-	R19-NQ		undulating, tight 107.0, 107.25, 108.5' - Fractures (3), 60 deg,	-	SC-5 collected at 107.25- 108.5'					
-	5 ft 100%			undulating, tight 107.0, 107.25, 108.5' - Fractures (3), 60 deg,		-	-			
110 -67.7			>10	109.0-109.3' - Fracture zone, 0-80 deg, rough, undulating, fragments 3/16"-2"		-	_			
-	111.0		3	109.8' - Fracture, 60 deg, rough, undulating, open to 1/16", organic material on faces 110.15' - Fracture, 45 deg, smooth, undulating	H	111.0-116.0' - Same as 101.0-106'	SC-6 collected at 111.0-			
_			1	110.25' - Fracture, 50 deg, rough, undulating, open to 1/16" 110.65' - Fracture, 60 deg, rough, undulating,		<ul> <li>except trace organics from 113.6-114.3', cavities to 3/8"x1-3/16" from 113.6-114.3'</li> </ul>	112.1' -			
-	R20-NQ 5 ft	100	0	open to 1/8" 112.1' - Fracture, 75 deg, rough, undulating, tight		-	-			
-	100%		0	113.6, 114.45' - Mechanical break (2)	H	_				
115 -72.7			0	<u> </u>	E	-				
-	116.0		0			116.0-119.5' - Same as 101.0-106.0'	-			
-			1	117 6' - Fracture 25 deg emooth undulating	Ħ	-	-			
-	R21-NQ 5 ft 70%	50	7	117.6' - Fracture, 25 deg, smooth, undulating, charcoal gray staining on 30%, tight 118.0-118.2' - Fracture zone, 0-50 deg, rough, planar, open to 1/16" 118.2' - Fracture, 50 deg, rough, planar, tight 118.65' - Fracture, 30 deg, smooth, undulating, tight		-	-			
120	1078		>10			- - No Recovery 119.5-121.0'	-			
-77. <u>7</u>				<u>-</u>	╁	_	_			



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

00111110	J WE THOU TH	10 0	2011 11	IENT . CIVIE 33 3/N 3 10023, ITIUU TOLATY, NQ LOOIS, HW C	aonig		ORIENTATION : Vertical
WATER	LEVELS: 2.5	ft bgs	s on 4	/10/07 START : 4/9/2007 END : 4/	18/20	D7 LOGGER : A. Teal, N. Jarzyniecki	, M. Faurote
305				DISCONTINUITIES	(J)	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		တ္သ	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
BH	F. A. C.	(%)	FRACTURES PER FOOT		임	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
TH¥ ¥¥T¥	R TEO OVE	6)	든	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BO	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
989	R N N N	Ø	RA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	≥	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ΔОШ	Olk	œ			S	CHAIGACTERIOTICS	
-	l		NR	118.9' - Fracture, 10 deg, smooth, undulating,	₩	_	-
-	121.0			loose 119.05' - Fracture, 25 deg, smooth,	+T	Limentone	-
_			>10	undulating, loose		Limestone - 121.0-122.1' - grayish orange, (10YR	_
			' ' '	119.2' - Fracture, 15 deg, smooth, undulating,	$\vdash$	7/4), fine grained, moderate HCl	
_			0	loose		reaction, medium strong (R3), voids	7
-	-			119.3-119.5' - Fracture zone, rough,	1	<1/16" on 40% of surface, trace	-
l -				undulating, to smooth and planar, fragments 3/8"-1"	₽	_ cavities to 3/8" diameter	_
	R22-NQ			121.0-122.2' - Fracture zone, 0-90 deg,		predominately fossil casts/molds	
	5 ft 22%	12		rough, undulating, fragments <3/16"-2"	<b>—</b>	- No Recovery 122.1-126.0'	7
-	22 /0		NR	121.3-121.9' - Fracture, vertical, rough,	₩	_	-
-				undulating, dark gray staining, open to 1/16"	₽T.	_	_
125				_	_		
-82.7					$\vdash$		
-	400.0			-	仜	-	=
-	126.0			126.0-126.6' - Fracture, 80 deg, rough,	<b>—</b>	Limestone	-
I -			>10	undulating, open to 1/16"	₽	- 126.0-128.0' - moderate yellowish	_
			'	126.3' - Fracture, 45 deg, rough, undulating,		brown with light olive gray	
_				tight	Ъ	laminations 1/4" thick, (10YR 5/4 with	_
-			>10	126.6-128.0' - Fracture zone, 0-75 deg,	╁	- 5Y 4/2), fine grained, moderate HCl	-
_				smooth, planar, to rough and undulating, fragments 3/8"-3"	$\perp$	reaction, medium strong (R3), voids <1/16" over 20% of surface trace	-
_	R23-NQ 5 ft	18	4	128.3' - Fracture, 35 deg, rough, undulating,	Ь	- cavities to 3/16", moderately	_
	86%	10	+	tight		fossiliferous, trace organics	
-				128.4' - Fracture, 35 deg, rough, undulating,	ш	128.0-130.3' - light olive gray, (5Y	7
-			2	tight, intersects fracture at 128.3'	+-	<ul> <li>5/2), fine grained, mild HCI reaction,</li> </ul>	-
130				128.5' - Fracture, 15 deg, smooth, undulating,	E	medium strong (R3), voids over 20%	
-87.7			2	open 128.5-128.9' - Fracture, 60-70 deg, smooth,	$\vdash$	of surface, few cavities to 3/16" predominately fossil casts/molds,	
	131.0		NR	undulating, tight	Н	moderately fossiliferous	
-	101.0			129.25' - Fracture, 60 deg, rough, undulating,	Ľ	No Recovery 130.3-131.0'	-
-			>10	tight	₽	_ Limestone	-
_				129.4' - Fracture, 20 deg, rough, undulating,	十二	131.0-133.5' - Same as 128.0-33.5'	_
				tight to open to 3/8" 130.0, 130.1' - Fractures (2), 30 deg, smooth,		except less cavities to 3/16" diameter	
-			>10	undulating, open, intersecting 130.1'	₽		7
-	l R24-NQ			131.3-131.6' - Fracture zone, up to 70 deg.	+	_	-
_	5 ft	25	0	rough, undulating, to smooth and undulating,			_
_	50%	-		fragments 3/8"-1"	$\vdash$	No Recovery 133.5-136.0'	
				131.9-132.2' - Fracture zone, 0-90 deg, rough, undulating, fragments 3/8"-1"			
125			NR	132.2' - Fracture, 25 deg, smooth, undulating,	1—	- <b> </b>	1
135_ -92.7			"``	open —	++	<u> </u>	-
				132.7' - Fracture, 50 deg, rough, undulating,		-	_
	136.0			tight	$\vdash$		
				136.0-136.8' - Fracture, 60 deg, smooth,		Limestone	7
I -			>10	planar, loose	ш	- 136.0-139.0' - moderate yellowish	7
-			$\vdash$		+	brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, medium	-
_			2		片	- strong (R3), voids <1/16" on 20% of	_
			_	137.5' - Fracture, 75 deg, smooth, planar,	$\Box$	surface, moderately fossiliferous,	
_	R25-NQ			loose 137.65' - Fracture, 60 deg, smooth, planar,	╁	trace molds to 3/8"x3/16", possible	7
-	5 ft	38	0	charcoal gray to black staining on 90-95% of	亡	healed fractures at 136.4' and 136.7'	-
-	60%			surface, loose	$\vdash$	No December 400 C 444 C	_
				, , , , , , , , , , , , , , , , , , ,	┰	No Recovery 139.0-141.0'	
140			l				1
-97.7			NR	<del>-</del>	₽		
1					1		



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

LEVELS : 2.5	ft bgs	s on 4/	10/07 START : 4/9/2007 END : 4	/18/200	7 LOGGER : A. Teal, N. Jarzynieck	i, M. Faurote
(%			DISCONTINUITIES	_ g	LITHOLOGY	COMMENTS
CORE RUN, LENGTH, AND RECOVERY (	3 Q D (%)	-RACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AN SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
141.0		>10 >10 1 0 NR	141.25-142.7' - Fracture zone, up to 75 deg, rough to smooth, undulating, dark staining, fragments <3/8"-3"  143.25' - Fracture, 45 deg, rough, planar, tight		Limestone 141.0-144.6' - Same as 136.0-139.0' except mainly light olive gray, (5Y 5/2), very fossiliferous below 142.0', molds to 3/16"x3/8" on 5% of surface  No Recovery 144.6-146.0'	
		1	146.7' - Fracture, horizontal, rough, undulating, open 147.2' - Fracture, 55 deg, rough, undulating, tight		146.0-150.6' - Same as 136.0-139.0' except several healed fractures at 147.0-148.0', inclined 55 deg	
92%	77	4	rough, undulating, 3 fragments to 1-1/2", tight to 1/16" open  149.45' - Fracture, 30 deg, rough, undulating, tight  149.75, 149.8, 149.9' - Fractures (3), 20 deg, rough, undulating, toose			SC-7 collected at 148.5- 149.45'
R28-NQ 5 ft 80%	63	1 2 1 >10 NR	150.6' - Fracture, 70 deg, rough, planar, tight  151.85' - Fracture, 75 deg, rough, planar, tight  152.2' - Fracture, 25 deg, rough, undulating, loose, organics on lower faces 152.3' - Fracture, 25 deg, rough, undulating, tight to open to 3/8"  153.2, 153.5' - Mechanical break (2) 153.8' - Fracture, 15 deg, rough, undulating, loose 154.5-155.0' - Fracture zone, 0-75 deg, rough, undulating, fragments 3/8"-1"		Limestone 151.0-155.0' - Same as 136.0-139.0' except cavities from 3/16" diameter to 3/4"x1-3/16" on 15-20% of surface from 153.5-154.5' and 151.9-152.3', trace organics from 152.0-152.3'	
R29-NQ 5 ft 94%	60	>10 >10 3 >10	156.0-156.5, 157.0-157.35' - Fracture zone (2), 0-60 deg, rough, undulating, brown staining on some fracture planes, fragments to 1-1/2"  158.8' - Fracture, 80 deg, rough, undulating, tight 158.95-159.5' - Fracture zone, 20-80 deg, rough, undulating, fragments to 3"		Limestone 156.0-160.7' - light olive gray, (5Y 5/2), fine grained, mild HCI reaction, medium strong to strong (R3 to R4), trace voids <1/16" except from 158.5-160.5' where voids present over 25% of surface, cavities to 9/16" diameter throughout core and associated with healed fractures	
• • • • • • • • • • • • • • • • • • • •	(%), AND (%)	(%) CORE RON (%) AND CO	141.0   COKE KINN   SID   COKE KINN   SID   COKE KINN   SID	DISCONTINUITIES   DESCRIPTION	DISCONTINUITIES   DESCRIPTION   DESCRIPTIO	DISCONTRIUTIES   STANDARD   DESCRIPTION



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.5	ft bg	s on 4	/10/07 START : 4/9/2007 END : 4/	18/20	D7 LOGGER : A. Teal, N. Jarzynieck	ki, M. Faurote
300	· ·			DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACING
A S S S S S S S S S S S S S S S S S S S	RUI. VER	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	OLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
	ORE ENG!	Ø	RAC'	PLANARITÝ, INFILLING MATERIAL AND	/MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	222	ď	##	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	
_	161.0		NR	160.5' - Fracture, 30 deg, rough, undulating,	$\perp$	- No Recovery 160.7-161.0'	1
-	101.0		INIX	tight at center, open to 3/8"	H	Limestone	1
-			1		仜	161.0-162.4' - moderate yellowish	1
-				161.9' - Fracture, 20 deg, rough, undulating,	+	brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, medium	1
-			>10	loose 162.0' - Fracture, 35 deg, rough, undulating,	+	strong (R3), laminated bedding at	1
-	R30-NQ			loose	Ħ	161.0-161.5', trace organics at 162.0', voids <1/16" on 15% of	-
-	5 ft	67	3	162.4-162.7' - Fracture zone, rough, undulating, brown staining on some surfaces,	╁	<ul> <li>surface grouped along bedding, trace</li> </ul>	1
-	84%			fragments 3/16"-1-1/2"	$\blacksquare$	cavities to 3/4" diameter 162.4-165.2' - light olive gray with	-
-			3	163.0, 163.9' - Fractures (2), 45 deg, closed,	仜	<ul> <li>moderate yellowish brown, (5Y 5/2</li> </ul>	-
165_ -122.7			0	healed 163.6' - Fracture, 60 deg, rough, planar, open —	$\vdash$	with 10YR 5/4), fine grained, mild HCl reaction, medium strong (R3),	-
-122.7			NR	164.7' - Fracture, 25 deg, rough, undulating,	F	<ul> <li>some cavities up to 1-9/16" oriented</li> </ul>	]
-	166.0		1717	loose 164.7-164.9' - Fracture zone, rough,	片	along healed fractures No Recovery 165.2-166.0'	]
l -			2	undulating, small fragments	₽	Limestone	
l _				166.3, 166.4' - Fractures (2), 20 deg, smooth, planar, tight	oxdot	166.0-170.8' - moderate yellowish	
l _			3	planar, agric		brown and light olive gray, (10YR 5/4 and 5Y 5/2), fine grained, mild HCl	
l _			٥	167.55' - Fracture, 85 deg, smooth, planar,	┢╥	reaction, medium strong (R3),	
	R32-NQ			tight 167.7' - Fracture, 20 deg, smooth, undulating,		laminated bedding at 166.0-166.8' and 169.7-170.1' inclined 30-35 deg	
	5 ft 96%	57	8	tight		with voids <1/16" on 25% of surface,	
_				167.85' - Fracture, 80 deg, smooth, planar, tight	Ш	trace cavities to 3/16"x1-3/4"	1
170			1	168.05' - Fracture, 40 deg, smooth.	ш	-	1
-127.7				undulating, tight — 168.15' - Fracture, 25 deg, smooth,		_	Casing advanced to 110.0'
-	171.0		2	undulating, tight	╁	-	end rock coring 4/12/07
-	17 1.0		NR.	168.4-168.6' - Fracture zone, same as 29.4-30.5'		<ul> <li>No Recovery 170.8-171.0'</li> <li>Limestone</li> </ul>	04/17/07 13:10 resume
-			0	168.85' - Fracture, 25 deg, rough, undulating,		171.0-175.7' - pale olive to light olive,	coring – R31 Not recorded in field
-				loose	╁	- (10Y 6/2 to 5Y5/2), mild to moderate	13:35 casing advanced to
-			3	169.65, 170.1' - Fractures (2), 35 deg, rough, undulating, loose	仜	HCI reaction, medium strong (R3), cavities to 1.2"x2.4"x3.6",	115.0'
-	R33-NQ			170.6' - Fracture, 50 deg, rough, undulating,	世	fossiliferous (casts/molds) up to	Corehole reamed from
1 -	5 ft	88	2	loose 172.25' - Fracture, 45 deg, rough, flat,	$\vdash$	10-15% of surface	115-171' begin coring at
-	94%			angular, dissolution break with healed 45 deg		L	171.0'
-			1	fractures 172.35, 172.8' - Fractures (2), 2-5 deg, rough	世	_	-
175 <u>-</u> -132.7				173.25' - Mechanical break, 35 deg, smooth —	$oldsymbol{oldsymbol{\sqcup}}$	<u> </u>	R33: 10 minutes
-132.7			0	174.0' - Fracture, 5-10 deg	口	-	1355. 10 Hillinutes
-	176.0		NR		世	No Recovery 175.7-176.0'	M Faurata hagina la suita
_			3	176.3, 176.5, 176.8, 178.1, 178.25, 178.3,	厂	Limestone - 176.0-178.9' - yellowish pale gray to	M. Faurote begins logging at 176.0'
_			لَـــٰ	178.55, 178.9-179' - Fractures (8), these	片	pale olive, (5Y 7/2 to 10Y 6/2), fine to	
_			0	fractures are related to breccia clast separations and high angle fractures that	$\vdash$	medium grained, mild HCl reaction, medium strong to strong (R3 to R4),	Heavy chatter at 176.0- 177.0'
				were partially healed	${\mathbb H}$	cavities to 1" on 15% of surface	177.0
	R34-NQ	43	10		口	associated with healed fracture traces, poorly fossiliferous	]
	5 ft 98%	43	'0		$\vdash$	(casts/molds), trace recrystallization	1
			10	179-179.2, 179.3, 179.45, 179.8, 180.1,	H	_ · · · · · · · · · · · · · · · · · · ·	1
180			10	180.15' - Mechanical break (6)			1
-137.7				_	₽		R34: 8 minutes
L					1		



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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.5	ft bg	s on 4/	/10/07 START : 4/9/2007 END : 4/	18/200	DT LOGGER : A. Teal, N. Jarzynieck	ki, M. Faurote
≥∩ ≘	(9)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
ELO N (#	AND 3Y (%	_	ÆS T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H B	E RU STH, OVEF	R Q D (%)	JUS I	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQI	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
_	-		2		Ш	- 178.9-180.9' - pale olive, (10Y 6/2),	_
_	181.0		NR.		Ш	very fine grained, mild HCl reaction, medium strong to strong (R3 to R4),	-
-	-		2	181.25' - Fracture, 7 deg, smooth, planar,	╀┼	- 15% voids due to fossil	-
-	-			minor iron oxide staining 181.95' - Fracture, 45 deg, rough, angular,	$\Box$	(casts/molds), cavities to 1" long by 1/4"x1/2"	-
-	-		>10	solution expanded 182.55' - Fracture zone, fragments to	H	No Recovery 180.9-181.0' Limestone	-
-	R35-NQ			1"x1-1/2"	甘	181.0-184.25' - Same as	R35: 9 minutes
-	5 ft 84%	59	1	183.25' - Fracture, 45 deg, planar to slightly undulating, with some carbonate	丗	_ 178.9-181.0'	SC-8 collected at 183.25-
-	. 04 /0			recrystallization	Ш	-	184.2'
185	-		1		╁┼╁	<ul> <li>184.25-185.2' - light brown to medium brown, (5YR 5/6 to 5YR</li> </ul>	-
-142.7	-		0	184.8' - Fracture, rough, undulating, with — carbonate recrystallization on fracture	H	4/4), fine grained, strong HCl reaction, medium strong (R3),	
	186.0		NR	surface, break is at the base of a clast in	П	containing very fine to fine grained	-
			>10	breccia 186.0-187.0' - Fracture zone, moderate to	囯	clasts with <10% fossil void space No Recovery 185.2-186.0'	-
			>10	heavy iron oxide, multiple fracture orientations	Ш	Limestone	
			1	187.25' - Fracture or mechanical break, very	Ш	186.0-186.9' - medium brown to dark brown, (5YR 4/4 to 5YR 3/4), heavily	
l _				angular surface	Ш	iron-oxide stained 186.9-187.6' - pale olive, (10Y 6/2),	_
_	R36-NQ 5 ft	0			$\vdash$	very fine grained, moderate HCl	-
_	32%				H	reaction  No Recovery 187.6-191.0'	_
_	-		NR		H	-	_
190 <u> </u>				_	冄		R36: 18 minutes
-					Ħ	-	-
-	191.0			191.0-192.0' - Fracture zone, multiple	甘甘	Limestone Fragments	-
-	-		>10	fractures, random orientations, fragments to		<ul> <li>191.0-192.0' - multiple rock fragments</li> </ul>	-
-	1			·	Ш	No Recovery 192.0-196.0'	-
-	-				╁┼	-	_
_	R37-NQ	0			Ш	-	-
	5 ft 20%	U	NR		Ш	_	
_			1		Ш	_	_
195_				_	Щ		
-152 <u>.7</u> -					口	-	R37: 11 minutes
-	196.0				団	_	-
-	-		2	196.3' - Fracture, 20 deg, rough, undulating	団	-	-
-	-			196.95' - Fracture, 40 deg, rough, undulating,	$\boxminus$	-	-
-	-		3	<5% recrystallization on surface 197.3' - Fracture, 30 deg, rough, minor	$H\overline{I}$	-	-
-	R38-NQ			recrystallization	日	-	-
-	5 ft 86%	67	2	197.65-197.75' - Fracture zone, fragments <1", recrystallization on surfaces, fragments	口	-	-
-	1 00,0			may be from cavity break down 198.5-198.8' - Fracture zone or bedding	Ħ	-	-
200	1		1	plane, 1-3 deg, smooth, planar, minor	Ħ	-	<u> </u>
-157.7			0	recrystallization, fragments <1"	$\mid \mid \mid$	<del></del>	R38: 4 minutes



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.5	ft bg	s on 4	110/07 START : 4/9/2007 END : 4/	18/20	07 LOGGER : A. Teal, N. Jarzynieck	i, M. Faurote
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			NR	199.05' - Fracture, 1-5 deg, rough, undulating	Ħ	- Limestone	_
-	201.0		>10	201.1-201.2' - Fracture zone, intersecting fractures, open <1/4"		196.0-198.4' - dusky yellow with moderate brown and dusky brown, (5Y 6/4 with 5YR 6/4 and 5YR 2/2), very fine grained, moderate HCI	N. Jarzyniecki begins logging at 201.0'
-			4	201.85' - Mechanical break, 10 deg 202.15, 202.65' - Fractures (2), rough, undulating, open to 1/2"	H	reaction, medium strong to strong  (R3 to R4), infill along bedding or subsidence planes inclined 65-80	- -
-	R39-NQ 5 ft 76%	54	0	202.3, 204.65' - Bedding plane, 40 deg, rough, undulating, open to 1/2" 202.95' - Bedding plane, 10 deg, smooth to	Ē	deg, organic material as discontinuous, lenticular to planar accumulations, 196.9-198.4' cavities	SC-9 collected at 203.5-
-	7070		2	rough, undulating, open to 1/4" 204.1' - Mechanical break	Ħ	to 1"x1/2" on 35% of surface, trace recrystallized infill of cavities, trace	204.4' - 204.0-205.0' hard drilling _
20 <u>5</u> -162.7			NR	204.8' - Fracture, 70-80 deg, smooth, undulating, open, organic staining		healed fractures  198.4-198.8' - pale brown, (5YR 5/2), very fine grained, mild to moderate HCl reaction, medium strong to	-
-	206.0		>10	206-206.4, 209.05-209.9' - Fracture zone (2), organic staining, intersecting fractures, open <1/4"	Ė	strong (R3 to R4), laminated bedding, irregular discontinuous contact at high angle, and healed	- -
-			2	<1/4 206.6' - Bedding plane, 30 deg, smooth, undulating, tight 207.55' - Bedding plane, <5 deg, smooth,		198.8-200.3' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, medium strong	Chatter throughout
-	R40-NQ 5 ft	37	1	undulating 207.8' - Fracture, 40-45 deg, rough, stepped,		(R3), highly fossiliferous     (casts/molds), 20% voids related to     fossil molds and casts	- -
-	78%		>10	open to 1/2" 208.8' - Fracture, 65 deg, rough, undulating, organic staining, open	H	<ul> <li>No Recovery 200.3-201.0'</li> <li>Limestone</li> <li>201.0-204.8' - yellowish gray to</li> </ul>	-
210_ -167.7 -	044.0		NR			dusky yellowish, (5Y 8/1 to 5Y 6/4),     very fine grained, weak to medium     strong (R2 to R3), voids <1/16" on	-
-	211.0		>10	211.0-211.5' - Fracture zone, rough, undulating, some organic staining, open to 1/4"	Ħ	- 15% of surface and cavities to 1/2" on 15% of surface, organics up to 10% of surface except 201.7-201.9	Chatter throughout R41
_			0	212.6' - Mechanical break	Ė	<ul> <li>and 204.25-204.4' which have 50% and 30% laminar organics, fossiliferous</li> <li>No Recovery 204.8-206.0'</li> </ul>	- -
-	R41-NQ 5 ft 60%	45	3	213.4, 213.5' - Bedding plane (2), <10 deg, smooth, undulating, open to 1/4"		Limestone 206.0-209.9' - light gray from 206.0-208.1' to dusky yellow below,	-
- 215 -172.7 -			NR	213.9' - Bedding plane, 10 deg, rough, undulating, organic staining, open to 1/4"		(N7 to 5Y 6/4), very fine grained, medium strong (R3), trace voids to <li>&lt;1/16" except from 208.0-209.0' voids on 30-50% of surface, fossiliferous (casts/molds)</li>	- - -
_	216.0		1	216.45, 218.6, 218.85, 219.35, 219.45,		No Recovery 209.9-211.0' Limestone 211.0-213.1' - dusky yellow with	-
-			0	219.6, 219.7, 220.75' - Bedding plane (7), 5-10 deg, rough, undulating, open to 1/4" 217.4' - Bedding plane, 25 deg, rough,	Ħ	<ul> <li>yellowish gray and light gray, (5Y 6/4 with 5Y 7/2 and N7), very fine</li> <li>grained, weak to medium strong (R2</li> </ul>	- -
-	R42-NQ 5 ft 98%	73	3	undulating, open to 1/4"		to R3), voids <1/16" on up to 50% of surface, fossiliferous, with fragments that are poorly fossiliferous with	-
220_	90%		5	218.9' - Bedding plane, rough to smooth, planar, organic staining, open to 1/4"	#	<15% voids to <1/16" 213.1-213.5' - yellowish gray, (5Y 7/2), very fine grained, trace voids <1/16", poorly fossiliferous, organic	- - -
-177.7						laminations throughout	



PROJECT NUMBER: BORING NUMBER:

338884.FL A-17

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

ORIENTATION: Vertical

SHEET 13 OF 14

WATER	LEVELS: 2.5	ft bg	s on 4/	10/07 START : 4/9/2007 END : 4	/18/200	D7 LOGGER : A. Teal, N. Jarzynieck	i, M. Faurote
≥0≎	_ @			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
225 -182.7	221.0 R43-NQ 5 ft 86%	48	1   NR/   1   >10   1   >10   >10   NR	220.3' - Mechanical break  221.35' - Fracture, 45 deg, rough, undulating, open to 1/8"  221.9, 223.4' - Mechanical break  222.35-222.5, 222.8-222.9, 224.0-225.3' - Fracture zone (3), rough, undulating, organic staining, open to <1/8"  222.7' - Fracture, 85 deg, smooth, undulating, organic staining, open to 1/2"  223.65' - Bedding plane, <5 deg, smooth, planar, open to 1/8"		<ul> <li>213.5-214.0' - dusky yellow with pale olive, (5Y 6/4 with 10YR 6/2), weak to medium strong (R2 to R3), voids</li> <li>&lt;1/16" on up to 50% of surface, fossiliferous</li> <li>No Recovery 214.0-216.0'</li> <li>Limestone</li> <li>216.0-220.9' - Same as 211.0-213.1' except dusky yellow, (5Y 6/4), medium strong (R3), voids to 1/8" on up to 70% of surface, highly fossiliferous (casts) decreasing with depth, clasts 1/2"-3" diameter, laminated organics from</li> <li>219.0-219.65'</li> <li>No Recovery 220.9-221.0' Limestone</li> <li>221.0-222.35' - dusky yellow with</li> </ul>	10:50 chatter at 223.0- 224.0' -
23 <u>0</u> -187.7	R44-NQ 5 ft 64%	48	2 3 >10 >10 NR	to <1/8"  226.55' - Bedding plane or mechanical break, 30 deg, rough, undulating to stepped 226.95' - Bedding plane, 15 deg, smooth, undulating, open to 1/4"  227.4' - Bedding plane, 15 deg, rough, undulating, open to 1/4"  227.8' - Bedding plane, 15 deg, rough, undulating, tight 227.9' - Bedding plane, 15 deg, rough, undulating, open to 1/2"  228.8' - Fracture zone, intersecting fractures, - open to 1/4"		yellowish gray infill, (5Y 6/4 with 5Y 7/2), fine grained, voids <1/16"  15-50% of surface, very fossiliferous (casts/ molds) 222.35-223.7' - dusky yellow , very pale orange and pale olive, (5Y 6/4, 10YR 8/2 and 10Y 6/2), trace voids <1/16", poorly fossiliferous 223.7-225.3' - Same as 216.0-220.9' except weak to medium strong (R2 to R3)  No Recovery 225.3-226.0' Limestone 226.0-229.2' - Same as 216.0-220.9'	SC-10 collected at 227.9- 228.8' -
23 <u>5</u> -192.7	R45-NQ 5 ft 46%	10	>10 >10 >10 >10	231.0-231.3, 232.1-232.4, 232.75-233.3' - Fracture zone (3), rough, undulating, intersecting fractures, open to 1/4" 231.5' - Bedding plane, 10 deg, smooth, undulating, open to 1/4" 231.55, 231.66' - Fractures (2), 60 deg, smooth, undulating, open to 1/4" 231.75' - Mechanical break 232.5' - Fracture, 60 deg, smooth, undulating, open to 1/4"		No Recovery 229.2-231.0' Limestone 231.0-232.1' - Same as 216.0-220.9' except medium strong (R3), laminations from 231.8'-231.9' 232.1-233.3' - pale olive, (10Y 6/2), fine grained, very weak to weak (R1 to R2), voids <1/16" on 50% of surface, very fossiliferous No Recovery 233.3-236.0'	- - - - - - -
240 -197.7	R46-NQ 5 ft 38%	0	>10 >10 NR	236.35-237.9' - Fracture zone, some organic staining, intersecting fractures, open to 1/4"		Limestone  236.0-237.9' - Same as 232.1-233.3' except pale olive to dusky yellow and light gray, (10Y 6/2 to 5Y 6/4, and N7), very weak to medium strong (R1 to R3), trace organics and voids  <1/16", poorly fossiliferous, light gray laminations at 236.75-237.1' and 237.8-237.85'  No Recovery 237.9-241.0'	- - - -



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-17	SHEET	14	OF	14

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723025.7 N, 458007.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.5	ft bg	s on 4/	/10/07 START : 4/9/2007 END : 4/	18/200	D7 LOGGER : A. Teal, N. Jarzynieck	ki, M. Faurote
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUE	SHR	A Q	PEI PEI	THICKNESS, SURFACE STAINING, AND TIGHTNESS	- SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-	241.0				H	-	_
-			>10	241.0-241.65, 244.4-244.75' - Fracture zone (2), open to 1/4", intersecting fractures	Ħ	Limestone - 241.0-241.65' - Same as 236.0-237.9' except no laminations	-
-			1	241.9' 243.9' - Bedding plane or mechanical 241.65-243.6' - S		241.65-243.6' - Same as	-
-	R47-NG 5 ft 80%	53	5	243.1' - Bedding plane or mechanical break, 10 deg, rough, undulating, open to 1/4" 243.4, 243.6' - Bedding plane (2), 10-15 deg,		_ 243.6-245.0' - pale olive, (10Y 6/2), very fine grained, weak (R2), poorly	-
245 202.7			>10	rough, undulating, open to 1/4" 243.8' - Bedding plane or mechanical break, 30 deg, rough, undulating, tight	呂	- fossiliferous	-
-202.7	246.0		NR	-	Ħ	No Recovery 245.0-246.0'	-
-			>10	246.0-246.4, 246.5-246.7, 247.6-247.7' - Fracture zone (3), intersecting fractures, open to 1/8"		<b>Limestone</b> - 246.0-247.7' - Same as 243.6-245.0'	14:38 end drilling Note: 4/19/07 grouted hole, used 59 bags quickcrete, 1
-			10	-	Н	-	bag hole plug
-	R48-NG			-		No Recovery 247.7-251.0'	-
-	5 ft 34%	13			Ш	_	_
_			NR	-	H	-	_
250_ -207.7				_			_
-	251.0				Ш	-	-
-				-	$\  \ $	Bottom of Boring at 251.0 ft bgs on - 4/18/2007	-
_						_	-
_				-	1	-	_
-				-	$\  \cdot \ $	_	-
_				-			-
-				_		_	_
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	l						1



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-18	SHEET	1	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler

WATER	LEVELS	: 2.0 ft bo	gs on 3/25	5/07 5	START : 2/24/2007 END : 3/8/2007 LOGGI	ER :	R. Gomez, C. LeBlanc
				STANDARD	SOIL DESCRIPTION		COMMENTS
A PICON	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME TIGOS OBOLID SYMBOL GOLOD		DEPTH OF CACING PRILLING PATE
H BE ACE ATIO		RECOVERY (ft)			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	3	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
42.3				(14)		+	
-	-					1	-
-						1	Water level is based on Ground Water
						1	Monitoring at LNP site (FSAR Table - 2.4.12.08)
						1	Soil relogged by J. Schaffer  Rock relogged by C. Dougherty
-						1	Water levels in boring not recorded
_	3.5				Citie Cond (CM)	-	
-	-		00.4	2-2-1	Silty Sand (SM)  3.5-3.9' - grayish orange, (10YR 7/4), wet, very loose, no HCl reaction, fine silica sand, 25% nonplastic fines /	/=	<u>                                     </u>
		0.4	SS-1	(3)	\no HCl reaction, fine silica sand, 25% nonplastic fines /	+	-
5 37.3	5.0				-	-	_
-	-					+	-
-	-					1	-
-	-					1	-
						1	
						]	
-	8.5				0 1/00		
-				2-2-3	Clayey Sand (SC) 8.5-9.4' - light bluish gray, (5B 7/1), wet, loose, no HCl		-
		0.9	SS-2	(5)	reaction, fine silica sand, 40% medium plastic fines	¥	-
10 32.3	10.0					+	-
-	-					+	-
-	-					1	-
-	-					1	-
						1	
_						1	_
-	13.5				Claver Cand (CO)	1	-72
-	-		00.0	3-3-5	Clayey Sand (SC) 13.5-14.1' - Same as 8.5-9.4'	_//	
l		1.1	SS-3	(8)	Poorly Graded Sand (SP)  14.1-14.6' - white to very light gray, (N9 to N8), wet,	4	<u> -</u>
15 <u> </u>	15.0				\loose, no HCl reaction, fine silica sand, trace	4	_
-					\nonplastic fines, trace black minerals	+	-
-	-					1	-
-	1					1	1
	]					]	
-							
-	18.5				No Decovery 19.5.00.0	1	_  -
-			00.4	0-0-0	No Recovery 18.5-20.0'	+	-
		0.0	SS-4	(0)		+	-
20	20.0					+	+ -
1							



PROJECT NUMBER:	BORING NUMBER:			_
338884 FI	Δ-18	CHEET	2 OF 11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler

WATER	LEVELS	: 2.0 ft bo	s on 3/25	5/07	TART : 2/24/2007 END : 3/8/2007 LOGGE	R : R	. Gomez, C. LeBlanc
				STANDARD	SOIL DESCRIPTION	(T	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLIC LOG	
E SE		RECOVE	RY (ft)	12011120210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH RFA EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	MBC	INSTRUMENTATION
				(N)		Ś	
22.3						1	_
_						1	_
l _						1	_
l _						1	_
_						1	_
_						1	_
_	23.5					<u> </u>	_
_				0-0-0	Fat Clay (CH) 23.5-24.2' - light to medium light gray, (N7 to N6), wet,		_
_		1.5	SS-5	(0)	very soft, high plasticity, no dilatancy, no HCl reaction		_
25	25.0			. ,	Sandy Lean Clay (CL)  24.2-25.0' - very light to light gray, (N8 to N7), wet,		_
17.3					very soft, medium plasticity, no to slow dilatancy, no	1	_
l _					HCl reaction, 41% fine silica sand	1	_
l _						1	_
_						1	_
_						1	_
_						1	_
_	28.5						
l _	28.9	0.4	SS-6	50/5 (50/5")	Silt With Sand (ML)	Ш	4
l _				(30/3)	hard, nonplastic, very rapid dilatancy, mild to		
30					moderate HCl reaction, 20% fine to medium sand, trace organics in laminar lenses, all carbonate		_
12.3					li doc organico in laminar lorisco, directionate	1	Change from 3-1/2" drag bit to 3-3/8" tricone roller bit at 30.0'
_						1	- I contact bit at 60.0
l _						1	_
_						1	_
_						1	_
-						1	]
-	33.5				0 1 0''' (111)	<b> </b>	_
-				17-29-65	Sandy Silt (ML) 33.5-35.0' - Same as 28.5-29.0' except moderate		
-		1.5	SS-7	(94)	yellowish brown, (10YR 5/4), moist, rapid dilatancy,		
35	35.0				25-30% fine to medium sand, all carbonate	Ш	Ц
7.3						1	_
-						1	_
_						1	_
-						1	
-						1	_
-						1	Original at 20 01
-	38. <u>5</u> 38.7	0.0	00.0	F0/0 F	Limentone Francesche	╀-	Grinding at 38.0'
-		0.2	SS-8	50/2.5 (50/2.5") /	Limestone Fragments 38.5-38.7' - moderate to strong HCl reaction, coarse	1	1 -
-				, ,	sand to fine gravel, fine grained, <1/16" voids	1	_
40						1	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-18	SHEET	3	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler

WATER	LEVELS	: 2.0 ft bo	gs on 3/25	5/07 5	START : 2/24/2007 END : 3/8/2007 LOGGER	R : R.	Gomez, C. LeBlanc
<u> </u>				STANDARD	SOIL DESCRIPTION	ڻ ق	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME LISCS COOLID SYMBOL COLOD	SYMBOLIC LOG	DEDTH OF CASING DOULING DATE
TH BE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	BOLI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
SUR!			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYM	INSTRUMENTATION
2.3				(/		Ħ	Moderate grinding
-					-	1	-
-					_	1	_
						]	
l -					_		
_					<u>-</u>	1	Driller's Remark: Clay, softer
-	43.5				Silt With Sand (ML)	<b>.</b>	-
-		0.0	SS-9	7-9-61	43.5-44.1' - medium dark gray, (N4), moist to wet, hard, nonplastic to low plasticity, rapid dilatancy,	Ш	-
		0.6	55-9	(70)	I \ moderate HCl reaction. 25% fine to medium silica /	ł	-
45 -2.7	45.0				sand, trace organics, all carbonate, organics in SS-9 appear to be grass	ł	Set HW casing to 30.0'
-					appear to be grass	1	-
-	-				-	1	-
-					-	1	-
_					_		_
_	48.5						_
-				14-38-43	<b>Silt With Sand (ML)</b> 48.5-49.0' - Same as 43.5-44.1' -	$\  \ $	-
		1.3	SS-10	(81)	Sandy Silt (ML) 49 0-49 8' - dark vellowish brown (10YR 4/2) wet	$\  \ $	-
50 <u> </u>	50.0				49.0-49.8 - dark yellowish brown, (10YR 4/2), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 43% fine to coarse sand, 3/8" thick	f	
-	-				clayey seams, all carbonate	ł	-
-	-				_	l	-
-	-				-	1	-
_					_		_
-	53.5	0.1	00.11	EO/E	Condy Cilt /MI )	<b> </b>	-
-	53.9	0.4	SS-11	50/5 (50/5")	Sandy Silt (ML)	₩	-
					\organics \	ł	-
55 <u> </u>					_	ł	Trip out 3" casing
-					-	1	-
-	-				-	1	-
_					_	1	-
	]						
-	58.5 58.8	0.0	00.40	F0/4		Ь.,	_
-	56.8	0.2	SS-12	50/4 (50/4")	h r-	ľ	-
-	-				-	-	-
60						$\vdash$	
1							



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-18	SHEET	4	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler

WATER	LEVELS	: 2.0 ft bo	gs on 3/25	5/07	START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  BETTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
THE YEAR			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
-17.7				(N)	
-17.7	4				I \58.5-58.7' - moderate vellowish brown. (10YR 5/4).
	4				wet, hard, nonplastic, rapid dilatancy, mild HCI reaction, 15% fine to medium sand, 10% organics in
	1				laminar beds   -
	1				
	4				
	4				
	63.5 63.8	0.3	00.10	50/4	Cita Mark Count (MI)
	63.8	0.3	SS-13	50/4 \ (50/4")	Silt With Sand (ML) 63.5-63.8' - moderate yellowish brown to dark
	4				63.5-63.8' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), moist, hard,
65_	1				\nonplastic, rapid dilatancy, moderate HCl reaction, 24% fine to medium sand, all carbonate —
-22.7	_				
	1				Driller's Remark: Hard drilling at 65.5'
	_				<b>.</b>
-	_				<b>.</b>
	1				<b>」</b>
	1				<u> </u>
	68.5				Cib (MI)
	68.8	0.2	SS-14	50/3 (50/3")	Silt (ML) 68.5-68.65' - Same as 63.5-63.8' except 10-15%
l .	1			(00/0)	\coarse sand to fine gravel-sized limestone in \ \ \ \ \ \
70_	1				\lenticular shapes
-27.7	1				<u> </u>
	1				<u> </u>
	1				<u> </u>
	1				<u> </u>
	_				
	1				
	73.5 73.7				
	10.7	0.0	SS-15	50/2 (50/2")	No Recovery 73.5-73.7'
	1			(00.11)	<b>]</b>
75_	1				
-32.7	_				<b>」</b>
	_				<b>」</b>
	_				<b>」</b>
	1				]
					<b>│</b>
	1				<b> </b>
	78.5				
	1			53-50-39	
	1	1.2	SS-16	(89)	
80	80.0				<u> </u>



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	<b>A-1</b> 8	SHEET	5	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler

WATER	LEVELS	: 2.0 ft bo	as on 3/25	5/07	START : 2/24/2007
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
JE SE	RECOV		RECOVERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
-37.7				(N)	
-37.7					Silty Sand With Gravel (SM)   78.5-79.7' - moderate yellowish brown, (10YR 5/4),   -
-					wet, very dense, mild to moderate HCl reaction, fine to coarse carbonate sand, 20% nonplastic fines,
-					35-40% fine to coarse gravel-sized limestone
-					
-					
_					
_	83.5				Silty Sand With Gravel (SM)
_			00.4=	15-11-34	83.5-84.8' - Same as 78.5-79.7' except black organics -
_		1.3	SS-17	(45)	in laminar beds from 84.6-84.8'
85 <u> </u>	85.0				
					- 1
-					- 1
-					- 1
-					HW casing set to 30.0', set NW casing to
-	88.5			22-52/4	Silty Sand With Gravel (SM)
-	89.3	0.6	SS-18	(74/10")	88.5-89.1' - Same as 83.5-84.8'
-					Begin Rock Coring at 88.5 ft bgs
-					Begin Rock Coring at 88.5 ft bgs See the next sheet for the rock core log
90					
-47.7					<del> </del>
-					1 1
-					1 1
_					1
_					1
_					11
					11
l _					
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-18 SHEET 6 OF 11

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, NW/HW casing

	LEVELS : 2.0	ft bgs	s on 3/	25/07 START : 2/24/2007 END : 3/3	2/2007	1 000ED - D 0 0 1 -Dl	_
≳ □ ≨			011 0		3/200/		
> L + -	. <u>.</u>			DISCONTINUITIES	ტ	LITHOLOGY	COMMENTS
O N N	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
ᆱᆼ	Z, Z	(%	N P		일	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F A A	SE F	D (%)	CT P	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	/BC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	SHE I	a a	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	₹	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	88.5	_			H	Limestone	Core run R0-NQ advanced
	00.0		1	88.7' - Fracture, horizontal, rough, undulating	口	- 88.5-90.0' - dusky yellow, (5Y 6/4),	88.5-91.0' to set 5-feet –
	R0-NQ			_	Н	fine grained, moderate to strong HCI	stroke for remainder of
90	2.5 ft	47	1	90.91 Fracture harizantal rough undulating		reaction, weak to medium strong (R2	borehole
-47.7	60%			89.8' - Fracture, horizontal, rough, undulating, — break is along plan of 1-3/16" clam shell	Н	— to R3), 80% coverage of 1/16" voids on surface, few larger 3/16" voids	SC-1 collected at 89.1- — 89.8'
			NR	fossil	╁┼	near lower end of run, moderately	R0: 4 minutes
-	91.0			-	Ш	fossiliferous (casts), lignite disk 1/8"	2/25/08 08:00 Begin
4			1	-	$\vdash \vdash \vdash$	thick, silty matrix when grains broken	inserting NQ rods -
				91.7' - Fracture, 25 deg, rough, undulating,	П	down - <b>No Recovery 90.0-91.0'</b>	_
				3/16" open, semi-tight	Н	Limestone	
1 7			1		Ш	91.0-96.0' - Same as 88.7-89.0'	1
-	R1-NQ			92.8' - Fracture, horizontal, smooth,	╁┼	<ul> <li>except more abundant cavities (up to 9/16") from 93.5-94.5', cavities</li> </ul>	-
1 -	5 ft	75	0	undulating, open	世	appear to be fossil molds, some	-
1 4	100%			04.01 Freetures 20.50 des seulliste	ш	small (1/16"x1/8") fragments of dark	Duillana Damani Lara af
1 ]			>10	94.0' - Fractures, 30-50 deg, multiple fractures	Ш	organic material from 94.5-96.0'	Driller's Remark: Loss of circulation between 94.0-
95			10	Haddares	Н		96.0'
-52.7				_	Н		R1: 14 minutes
	00.0		2	95.4' - Fractures (2), 45 deg, almost	Ш	_	-
1 +	96.0			perpendicular, one is smooth and undulating with some dark staining, other is rough and	HH	_ Limestone	-
4			>10	undulating with no staining		- 96.0-97.3' - yellowish gray with pale	-
]				96.0-97.3' - Fractures, 0-90 deg, rough,	Н	olive (20%), (5Y 7/2 with 10 6/2), fine	_
			>10	undulating, slightly weathered, 3/16" relief,		grained, moderate to strong HCl - reaction, weak (R2), 50-60%	
]				open	Н	coverage of 1/16" voids on surface,	
	R2-NQ			-	Ш	areas with voids mix irregularly with	-
	5 ft	0		-	₩	- areas without voids, moderately	-
	26%		NR	-	団	fossiliferous, few voids >1/16"  No Recovery 97.3-101.0'	-
			IVIX	-	$\vdash$	-	_
100_				_			
-57.7					Ш		R2: 7 minutes
1 7	101.0			-	Ш	_	_
1 +	101.0			101.0-102.8' - Fractures, 0-45 deg, rough,	尸	_ Limestone	-
1 -			>10	undulating, up to 3/16" relief, open, one 2"	버	- 101.0-102.0' - Same as 96.0-97.3'	-
1 4				fragment shows coring marks in two different	Ш	except up to 20% voids, 6-7	Drillorla Domorte Lave
1 ]			>10	directions (at 101.9'), fracture at 102.1' is moderately tight and 30% rough and	Ш	gastropod casts up to 3/16" - 102.0-102.3' - dusky yellow, (5Y 6/4),	Driller's Remark: Low recovery possibly from -
				undulating	口	fine grained, moderate to strong HCI	losing inner core from
1 7	R3-NQ				Н	reaction, weak (R2), 85% coverage	broken pieces during
	5 ft 36%	17		-	口	of 1/16" voids on surface 102.3-102.8' - light olive gray, (5Y	drilling actions – Drilling head appears loose
1 -	3070			-	╁┼┼	5/2), fine grained, moderate to strong	during coring causing an
1 -			NR	-	口	<ul> <li>HCl reaction, 30% coverage of 1/16"</li> </ul>	eccentric advancement, -
105 -62. <del>7</del>					₽₩	voids on surface No Recovery 102.8-106.0'	breaking up rock
-02.7				_	Щ	- Necovery 102.0-100.0	R3: 11 minutes
	106.0				Н		
1 7					口	-	1
			>10	106.3-107.0' - Fractures, 0-60 deg, rough, undulating, fragments range from 3/16" to	₩	-	-
1 -				undulating, fragments range from 3/16° to 1-1/2", open	団	-	-
1 4			5	107.0-107.4' - Fracture, vertical, rough,	$\square$	_	_
1 ]				undulating, tight	世	_	
	R4-NQ				Щ		
					Ιl		



PROJECT NUMBER: BORING NUMBER:

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ORIENTATION : Vertical

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, NW/HW casing

WATER	LEVELS: 2.0	ft bg	s on 3/	25/07 START : 2/24/2007 END : 3/	8/2007	LOGGER : R. Gomez, C. LeBland	
≩Q⊋	<u>(%</u>			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H B	E.R.L.	(%) <sub>Q</sub>	JE S	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURF	SOR	ROI	FRAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	N×	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	5 ft	35	2	107.4, 107.7, 107.8, 107.10' - Fractures (4),	9,	Limestone	
-	100%			0-20 deg, rough, undulating, open	$\Box$	<ul> <li>106.0-111.0' - yellowish gray, (5Y</li> </ul>	-
			2	108.3' - Fracture, 10 deg, rough, undulating, open up to 3/16"	$\Box$	7/2), fine grained, moderate to strong HCl reaction, weak (R2), 90%	-
110_ -67.7				108.8' - Fracture, 60 deg, rough, undulating, —	世	<ul> <li>coverage of 1/16" voids on surface,</li> </ul>	R4: 10 minutes —
-			2	tight 109.2' - Fracture, 45 deg, rough, undulating,	₽₽	<5% coverage of 3/16" fossil molds on surface, particularly in top half of	-
-	111.0			open up to 1/16"	H	<ul> <li>section, some very small fragments</li> </ul>	-
-			1	109.7' - Fracture, 10 deg, rough, undulating, open	丗	of organic material below 110.0' 111.0-116.0' - Same as 106.0-111.0'	SC-2 collected at 111.55-
-				110.6' - Fracture, 65 deg, rough, undulating,	+	<ul> <li>except mild to moderate HCl</li> </ul>	112.35' -
-			3	tight 110.8' - Fracture, 10 deg, rough, undulating,	$\Box$	reaction, moderately fossiliferous from 112.0-114.0', 1/16" voids-molds	-
-	R5-NQ			open to 1/16"	$\Box$	-	-
-	5 ft	75	2	111.2' - Fracture, 45 deg, smooth, undulating, dark staining on 60%	丗	-	-
-	100%			112.5, 112.7, 112.8' - Fractures (3), 0-45 deg,	╀┦	-	-
-			0	rough, undulating, open 113.2, 113.9' - Fractures (2), horizontal,	₽	-	-
115_ -72.7				rough, undulating, 3/16" relief, open	口		R5: Run time not recorded
-			2	113.8' - Mechanical break 115.2' - Fracture, horizontal, rough,	丗	-	
-	116.0			undulating, open	╂┼╂	Limestone	-
-			2	115.7' - Mechanical break, rounded ends 116.4' - Fracture, 60 deg, rough, undulating,	$\Box$	- 116.0-118.0' - Same as 111.0-116.0'	-
-				tight to 1/16" open 116.9' - Fracture, 5 deg, smooth, undulating,		_	_
-			1	open	Ш	-	-
-	R6-NQ			117.8' - Fracture or mechanical break, 5 deg,	₽₽	118.0-121.0' - light olive gray, (5Y	-
-	5 ft	68	4	rough, undulating, tight to open 1/16" 118.1, 118.9' - Fractures (2), horizontal,	扫	- 5/2), fine grained, moderate to strong	-
-	100%			smooth, undulating, dark staining, open	丗	HCl reaction, weak (R2), fine grain, 50-60% coverage of 1/16" voids on	-
-			1	118.3, 118.5' - Fractures or mechanical break (2), 10 deg and 20 deg, rough, undulating,	╁╁	<ul> <li>surface, few larger voids &lt;1/16",</li> </ul>	-
120 <u> </u>				tight _	+	voids are fossil casts	R6: Run time not recorded
-			3	119.7' - Fracture or mechanical break, 10 deg, rough, undulating, tight to open 1/16"	$\Box$	-	- Tro. Prair time not recorded
-	121.0			120.1-120.4' - Fractures, 0-45 deg, dark	H	Limestone	SC-3 collected at 121.0-
-			1	staining at 120.4', open	ᡛ╢	- 121.0-121.9' - yellowish gray, (5Y	121.9' -
-				121.9' - Fracture, horizontal, rough,	$+\Box$	7/2), fine grained, moderate HCl reaction, <30% coverage of <1/16"	From 122.0-125.0' coring
-			>10	undulating, rounded surface, open	口	<ul> <li>voids on surface, poorly fossiliferous</li> </ul>	increased with loss of -
-	R7-NQ		$\vdash$	122.0-122.4' - Fractures, 0-90 deg, rough, undulating, open	団	121.9-122.5' - yellowish gray, (5Y 7/2), fine grained, strong HCl	circulation, possibly a void or unconsolidated sands
-	5 ft	18		122.7' - Fracture or mechanical break, 20 deg, rough, undulating, open to 1/16"	$\Box$	<ul> <li>reaction, very weak to weak (R1 to</li> </ul>	Lack of recovery may have -
-	40%			acy, rough, undulating, open to 1/10	$\Box$	R2), 85% coverage of <1/16" voids on surface, remainder is larger 3/8"	occurred from 122.0-125.0' based upon a drop in the
			NR		$\Box$	<ul> <li>cavities, moderately fossiliferous,</li> </ul>	drilling head that stopped -
125 -82.7				_		grades into below 122.5-123.0' - light olive gray, (5Y	at 125.0' followed by hard
-					₽	<ul> <li>5/2), fine grained, mild to moderate</li> </ul>	Core barrel having trouble -
-	126.0		$\vdash$		幵	HCl reaction, weak (R2), 90% coverage of 1/16" voids on surface,	pulling out of casing Inner/outer core barrels
-			4	126.3-126.5' - Fractures, 0-45 deg, open,	団	<ul> <li>moderately fossiliferous</li> </ul>	lodged in borehole _
-				fragments up to 1-1/2" 126.6' - Fracture, horizontal, rough,	丗	No Recovery 123.0-126.0'	R7: Run time not recorded
-	-		1	undulating, relief 3/16" open	╂┼┦	-	-
-	R8-NQ		>10		冄	-	-
_	1/0-1/0		>10		+		
					_		1



WATER LEVELS: 2.0 ft bgs on 3/25/07

PROJECT NUMBER: BORING NUMBER: 338884.FL A-18

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

START: 2/24/2007

DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler ELEVATION: 42.3 ft (NAVD88)

END: 3/8/2007

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, NW/HW casing

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300	·	DISCONTINUITIES			LITHOLOGY		COMMENTS		
A A P	-, NY ND (%)		ËS	DESCRIPTION	) LOG	ROCK TYPE, COLOR,	OLZE AND DEDTH OF GARING		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND		
FF.F.	NG.	Ω	AC-	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
		ď	F B	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	Brief e, feet reedere, etc.		
	5 ft 66%	40	NR	126.9' - Fracture or mechanical break, horizontal, rough, undulating, tight to 1/16"	$\mathbb{H}$	Limestone - 126.0-126.9' - light olive gray, (5Y	After substantial downtime due to casing/core barrel –		
			2	open		5/2), mild to moderate HCl reaction,	lock, the borehole has		
130				127.9' - Fracture, horizontal, rough,		weak (R2), 75% coverage of 1/16"	been reamed inside HW		
-87.7			NR	undulating, open to 3/8"  128.1-128.5' - Fracture zone, 0-90 deg, open,	$\vdash$	<ul><li>voids on surface, &lt;5% coverage of larger voids (up to 3/16") on surface,</li></ul>	casing with 3-7/8" tricone — bit to 126.0', HW casing		
-	131.0		IVIX	fragments up to 1-1/2"		moderately fossiliferous	spun to 126.0' (NQ is at		
-	101.0		0	129.1' - Fracture, horizontal, rough, undulating, open, thin layer of carbonate	╁	<ul> <li>126.9-128.5' - dusky yellow, (5Y 6/4), moderate to strong HCl reaction,</li> </ul>	126.0' also) -		
-			NR >10	derived silt face	Ш	very weak to weak (R1 to R2), 90%	C. LeBlanc begins logging		
-				129.8' - Fracture, horizontal, rough, undulating, open	仜	<ul> <li>coverage of 1/16" voids on surface, poorly fossiliferous</li> </ul>	Driller's Remark: Soft – drilling at 128.5'		
-			>10	131.2-131.7' - Fracture zone, 0-70 deg,	+	No Recovery 128.5-129.1'	Driller's Remark: Soft		
-	R9-NQ		NR	rough, undulating, open	F	- Limestone	drilling below 130.0'		
-	5 ft	40		132.1' - Mechanical break 132.7' - Fracture, 60 deg, rough, undulating	世	129.1-129.8' - light olive gray, (5Y 5/2), moderate HCl reaction, weak	R8: 9 minutes No recovery intervals at		
-	53%		>10	133.6' - Fracture, horizontal, smooth,	╀	(R2), 85% coverage of 1/16" voids	131.2-131.5' and 132.7-		
-			0	undulating, open, film of carbonate derived silt infill	ш	on surface, few larger (up to 1/8") at 129.1-129.3'	133.6' based on drilling rate		
135				133.9' - Mechanical break	一	No Recovery 129.8-131.0'	Driller's Remark: Soft		
-92.7			NR	<u>-</u>	$\vdash$	Limestone 131.0-131.2' - dusky yellow, (5Y 6/4),	drilling Driller's Remark: Soft		
_	136.0			_		_ moderate HCl reaction, very weak to	drilling		
_			3	136.2, 136.5, 136.6' - Fractures (3),	╁	weak (R1 to R2), 90% coverage of	R9: 7 minutes		
_			NR	horizontal, rough, undulating, open	$oldsymbol{oldsymbol{eta}}$	1/16" voids on surface No Recovery 131.2-131.5'			
l _				40741 5 4 4 4 4 4 4 4		Limestone			
			2	137.4' - Fracture, horizontal, smooth, planar to stepped, open		131.5-132.7' - Same as 131.0-131.2' No Recovery 132.7-133.6'			
	R10-NQ		_3_/	137.9' - Fracture, 5 deg, rough, undulating,	$\vdash$	Limestone	1		
-	5 ft 30%	10		dark staining, open up to 1/16" 138' - Fracture, 45 deg, smooth, undulating,	世	- 133.6-134.7' - Same as 131.0-131.2' except with fossil molds and casts up	1		
-				dark staining, open up to 3/16"	╁	to 3/8" over <5% of surface	1		
140			NR	138.1, 138.9' - Fractures (2), horizontal, rough, undulating, open	Ш	No Recovery 134.7-136.0' Limestone	1		
-97.7					ш	136.0-136.6' - Same as 131.0-131.2'	R10: 6 minutes		
-	141.0			-		<ul> <li>except more abundant larger voids (1/16"-3/16"), moderately</li> </ul>	1		
-	141.0			141.0-141.8' - Fracture zone, 0-75 deg, black	╁	fossiliferous	1		
-			>10	staining on some surfaces, open	匚	<ul> <li>No Recovery 136.6-137.4'</li> <li>Limestone</li> </ul>			
-			0		H	137.4-138.2' - yellowish gray and	-		
-					oxdapprox	- light olive gray, (5Y 7/2 and 5Y 5/2),	-		
-	R11-NQ			-	口	moderate to strong HCl reaction, medium strong to strong (R3 to R4),	-		
-	5 ft	13			$\Box$	<ul> <li>laminated layers, laminations are at</li> </ul>	-		
-	30%		ND	-	$\vdash$	angle of 10 deg, some have 1/16" voids, otherwise small voids are	-		
-			NR			<ul> <li>limited to a few small areas, few</li> </ul>	-		
145 -102.7				_	世	fossil molds No Recovery 138.2-141.0'	R11: 3 minutes		
- 102.7					oxdappi	_ Limestone	IXII. S IIIIIIules		
-	146.0			146.0.146.0\ Fracture ===== 0.60.de=	口	141.0-141.2' - Same as 138.9-139.0' 141.2-141.8' - dusky yellow, (5Y 6/4),			
-			>10	146.0-146.9' - Fracture zone, 0-60 deg, rough, undulating	$\vdash$	_ moderate to strong HCl reaction,			
_					尸	weak (R2), 85% coverage of 1/16" voids on surface	]		
I _			3	147.2, 147.4, 147.8' - Fractures (3),	片	- Volus OII sui lace	<u> </u>		
_				horizontal, rough, undulating, black staining, open, faces don't match	H	_	]		
	R12-NQ			open, laces don't match	Ш				



WATER LEVELS: 2.0 ft bgs on 3/25/07

PROJECT NUMBER: BORING NUMBER: 338884.FL A-18 SHEET 9 OF 11

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler

END: 3/8/2007

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, NW/HW casing START: 2/24/2007

DISCONTINUITIES

LOGGER: R. Gomez, C. LeBlanc LITHOLOGY COMMENTS

>	<u></u>			DIOCONTINUITIES	CD	LITTOLOGI	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	5000	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ACE ATIO	TH',	(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EV.	ORE	ΩD	ZAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
					Ś	CHARACTERISTICS	<u> </u>
_	5 ft 66%	18	3	148.2' - Fracture or mechanical break, 25 deg, rough, undulating, tight to open 3/16"	H	141.8-142.5' - yellowish gray, (5Y - 7/2), moderate HCl reaction, weak	_
_			0	148.3' - Fracture, 25 deg, smooth, undulating,	Ш	(R2), 80% coverage of 1/16" voids	
150_				open 148.6' - Fracture or mechanical break, 45 —		on surface, fossil molds (3/16") from 141.8-142.1', layer without voids from	
-107.7			NR	deg, rough, undulating, tight to 3/8" open		142.3-142.5	R12: 13 minutes
	151.0					No Recovery 142.5-146.0' Limestone	
						146.0-146.9' - yellowish gray, (5Y	
_			1	454 OL Frankris 40 dan savah wadulatian		7/2), fine grained, moderate to strong	1
_				151.8' - Fracture, 10 deg, rough, undulating, open	H	<ul> <li>HCl reaction, weak (R2), 75% coverage of &lt;1/16" voids on surface,</li> </ul>	1
_			2	152.1' - Fracture or mechanical break, 10	口	larger voids (up to 9/16") over 10% of	1
_	R13-NQ	!		deg, rough, planar, tight to open up to 3/16" 152.8' - Fracture, horizontal, rough,	╁╴	- surface 146.9-149.3' - light olive gray, (5Y	1
-	5 ft 82%	71	1	undulating, open up to 3/16"		5/2), mild to moderate HCl reaction,	1
-	0270			153.3' - Fracture, horizontal, rough, undulating, dark staining on lower face, open	Ħ	medium strong (R3), <5% coverage of 1/16" voids on surface, most being	-
155			2	154.1' - Mechanical break	₩	below 148.5', few larger <3/16" voids	
155_ -112.7			0 /	154.6' - Fracture, horizontal, rough, — undulating, open to 3/16"	₽	(fossil molds) below 148.5' No Recovery 149.3-151.0'	R13: 12 minutes
-			NR	undulating, open to 3/10	t	Limestone	-
-	156.0				+	151.0-155.1' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), fine	-
_			2			grained, moderate HCl reaction,	-
-				156.75, 156.85' - Fractures (2), horizontal,	Ľ	weak (R2), 90% coverage of 1/16"	-
-			>10	rough, undulating, open 157.2-157.9' - Fracture zone, horizontal,	₽	voids on surface to 154.2', then only over 40% of surface, cavities (fossil	-
_	DIANO			rough, undulating, every 0.05-0.1' is a	П	molds) up to 3/8" up to 5% of surface	-
_	R14-NQ 5 ft	50	4	fracture, open to 3/16", rock fragments from 157.6-157.8'	扛	throughout interval No Recovery 155.1-156.0'	
_	90%			158.2, 158.7, 158.9, 159.1' - Fractures (4),	╁╴	Limestone	_
_			3	horizontal, rough, undulating, olive brown staining on face at 158.7', open, faces do not		156.0-158.1' - yellowish gray, (5Y 7/2), fine grained, moderate HCl	_
160_				match		reaction, weak (R2), 60% coverage	
-117.7 -			1	159.2, 159.9, 160.0' - Fractures (3), horizontal, rough, undulating, rounded at	⊬	of 1/16" voids on surface, most are present from 156.5-157.0' and	R14: 14 minutes
_	161.0		NR	159.2', faces match poorly	Ш	157.4-158.1'	
_			0		厂	158.1-158.9' - light olive gray, (5Y 5/2), fine grained, moderate HCl	
			L		Ь	reaction, weak (R2), laminated with	]
				162.0, 162.3' - Fractures (2), horizontal and	F	dusky yellow 5Y 6/4, laminations are irregular and uneven, <1/16" voids	1
			4	10 deg, undulating, black staining on lower face at 162.0', rough at 162.3', smooth at	Ľ	present along laminations	1
_	R15-NQ		4	162.6', faces poorly match	$\vdash$	158.9-160.5' - light olive gray, (5Y 5/2), fine grained, moderate HCl	1
_	5 ft 46%	28		162.7' - Fracture, 5 deg, planar, coarse grained bedding plane	${\mathbb H}$	reaction, weak (R2), <1/16" voids,	1
_				163.0' - Fracture, horizontal, rough, planar,		few fossil molds (up to 3/16")	1
165			NR	open 163.0-163.3' - Fractures, horizontal, rough,	Ш	Limestone	
-122.7				dark staining on upper face at 163.2', planar	$\vdash$	161.0-162.0' - Same as 158.9-160.5'	R15: 5 minutes
-	166.0			to undulating, faces match poorly 163.7' - Fracture or mechanical break,	Ħ	<ul> <li>except 20% coverage of &lt;1/16" voids on surface, larger voids (3/16"), fossil</li> </ul>	
-	166.0			horizontal, rough, undulating, tight to 3/16"	世	molds also visible	-
-			3	open 166.1, 166.4, 166.8' - Fractures (3),	╨	162.0-163.3' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl	-
-				horizontal, rough, undulating, faces match	仜	reaction, weak (R2), 95% coverage	-
-			>10	poorly, open up to 3/8"	士	of <1/16" voids on surface, cavities (up to 3/16") on remaining 5%	-
-	R16-NQ				$\vdash$	No Recovery 163.3-166.0'	-
					F	<del> </del>	_
					1		



PROJECT NUMBER:	BORING NUMBER:			
338884 FI	Δ-18	CHEET	10	OE

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler

WATER	LEVELS : 2.0	ft bg	s on 3/	25/07 START : 2/24/2007 END : 3/	8/2007	7 LOGGER : R. Gomez, C. LeBland	
≥∩ ټ	(9)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIO	E RU	(%) Q	F.00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	3OLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV E	SORE	ROD	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ЦОШ	5 ft	23	2	167.0-167.6' - Fracture zone, 0-90 deg, black	0)	Limestone	
_	62%		0	staining on vertical faces, fragments from	Ħ	- 166.0-169.1' - light olive gray, (5Y	R16: 18 minutes
_				3/16" to 3-1/2", faces match poorly	H	5/2), fine grained, moderate HCl reaction, medium strong (R3), 10%	R 16. 16 minutes
170_ -127.7			NR	167.9' - Fracture zone, horizontal, rough, undulating, open to 3/16" —	ш	<ul> <li>coverage of 1/16" voids on surface,</li> </ul>	_
-127.7			\	168.3' - Fracture, horizontal, rough,	Ш	few larger (up to 3/16") voids and	_
_	171.0			undulating, open 168.5' - Fracture, horizontal, rough,	Н	fossil molds, except from about - 166.9-167.4', zone from 167.5-167.9'	_
_			3	undulating on upper face, smooth and planar		has no voids but is laminated with	_
_				on lower, open, some 3/8" fragments 169.0' - Mechanical break	H	darker zone from 167.7-167.9', brass  - colored to dark colored staining on	
_			3	171.1, 171.2' - Fractures (2), horizontal,	Н	broken surface across darker zone	SC-4 collected at 171.2-
			J	smooth, planar, open up to 3/16" 172.0' - Fracture or mechanical break, 45	Ш	No Recovery 169.1-171.0' Limestone	173.0'
1	R17-NQ	34	2	deg, rough, undulating	Щ	171.0-172.0' - light olive gray, (5Y	]
1	5 ft 88%	34		172.2' - Fracture or mechanical break, horizontal, rough, undulating, open up to 3/8"		5/2), fine grained, moderate HCl reaction, medium strong (R3), some	1
1 -				172.3-172.7' - Mechanical break or fractures,	$\mathbb{H}$	<3/16" fossil molds	1
175			5	0-65 deg, open to 3/16" 173.4, 173.6' - Fractures (2), horizontal,	Ħ	172.0-173.5' - yellowish gray, (5Y 7/2), moderate HCl reaction, weak to	1
-132.7			1	smooth, planar, open to 3/16"	Ш	medium strong (R2 to R3), 50%	R17: 16 minutes
_	176.0		NR	174.1, 174.2, 174.3' - Fractures (3), 0-5 deg, smooth, planar, open up to 3/16"	Н	coverage of 1/16" voids on surface, larger (up to 3/8") voids up to 5%,	1
-	170.0			174.6' - Fracture or mechanical break,	П	moderately fossiliferous	1
_			3	horizontal, rough, undulating, open up to 1/16"		173.5-175.4' - Same as 171.0-172.0'	1
_				1710 174.8, 175.1' - Fractures (2), horizontal,	Н	No Recovery 175.4-176.0' Limestone	1
-			8	rough, undulating on upper face and planar on lower face	Ħ	176.0-180.7' - Same as 172.0-173.5'	1
-	R18-NQ			176.4, 176.6' - Fractures (2), horizontal,	Ħ	<ul> <li>except fewer large voids and fossil molds, poorly fossiliferous</li> </ul>	1
-	5 ft 94%	46	2	rough, undulating, open to 3/16"	Н	_	1
-	94 /0			176.7' - Fracture, horizontal, smooth, planar, open to 1/16"	Ш	_	1
100			5	177.1, 177.15, 177.2, 177.4, 177.7, 177.75,	ш		-
180 <u>-</u> -137.7				177.8, 177.9' - Fractures (8), horizontal, smooth, planar to slighty undulating, open	ш	<del></del>	R18: 19 minutes
-	404.0		2	1/16" to 3/16"	Н		-
1 -	181.0		NR	178.3' - Fracture, horizontal, rough, undulating, open, fragments up to 1/2"	Ħ	No Recovery 180.7-181.0' Limestone	-
-			>10	178.9-179.4' - Fractures (4), 0-45 deg, rough,	Ш	<ul> <li>181.0-182.0' - yellowish gray, (5Y</li> </ul>	-
1 -			$\vdash$	undulating, open, fragments up to 1" 179.8, 179.9' - Fractures (2), horizontal,	${\mathbb H}$	_ 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2	-
1 -			0	rough, undulating, open to 3/16"	Ш	to R3), few voids <1/16", voids are	-
-	R19-NQ			180.3' - Fracture, horizontal, smooth, planar to stepped, open to 3/16"	団	present in thin bands about 20-50 deg from horizontal, few larger voids	-
1 -	5 ft	18	>10	180.4' - Fracture, horizontal, rough,	H	- 182.0-183.7' - Same as 176.0-180.7'	-
-	54%		]	undulating, open, rounded faces 181.0-182.0' - Fracture zone, 0-90 deg,	$H\overline{I}$	_ No Recovery 183.7-186.0'	-
				rough, undulating, some slight dark staining	H	_	-
185 -142.7			NR	at 181.6' – 182.0-183.0' - Mechanical break –			R19: 15 minutes
-				183.0-183.7' - Fracture zone, 0-90 deg,	H	_	- 13 minutes
1 -	186.0			rough, undulating, fragments up to 1-1/2" 186.0-186.4' - Fractures, horizontal, multiple	H	Limestone	-
1 -			3	1" fragments, open	団	<ul> <li>186.0-186.5' - dusky yellow, (5Y 6/4),</li> </ul>	-
-					Н	fine grained, moderate HCl reaction, weak (R2), 90% coverage of <1/16"	-
-			1		A	<ul> <li>voids on surface, few cavities (up to</li> </ul>	
-	R20-NQ			187.8' - Fracture, horizontal, smooth, planar,	H	_ 9/16")	
<u> </u>	4.5 ft	37		open to 1/16"	H		
1							
L					1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-18	SHEET	11	OF	11	

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722986.9 N, 458047.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: R. Woodard, P. Buchler

WATER	LEVELS : 2.0	) ft bg	s on 3	/25/07 START : 2/24/2007 END : 3/8	3/200	7 LOGGER : R. Gomez, C. LeBland	
≥0.0	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 190 -147.7 -	190.5		>10 >10 NR	188.2-189.1' - Fracture zone, rough, undulating, fragments up to 2"		186.5-189.1' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak (R2), 40% coverage of <1/16" voids on surface to 187.3', over 90% of surface with larger (up to 3/16") below 187.3', moderately fossiliferous - No Recovery 189.1-190.5'	R20: 14 minutes R21: 52 minutes
- - - - 195 -152.7	R21-NC 5 ft 76%	17	3 >10 >10 NR	horizontal, rough, undulating, black staining on face at 190.9', open up to 3/8"  191.7, 192.5' - Fractures (2), horizontal, rough, undulating, open to 3/16"  191.9' - Fracture, 45 deg, rough, undulating, open 192.7-194.3' - Fracture zone, 0-45 deg, rough, undulating, open, fragments up to 2" long		Limestone  190.5-194.3' - yellowish gray, (5Y  7/2), fine grained, moderate to strong HCl reaction, weak (R2), 40% coverage of <1/16" voids on surface in zone from 191.3-192.8' and 193.5-194.3', moderately fossiliferous in same zone, color grades to dusky yellow (5Y 6/4) by 193.0', dark thin (1/16") irregular laminations visible at 192.5-192.7'  No Recovery 194.3-195.5'	On 3/7/07 all day was spent addressing/fixing borehole cave-in issues, casing was set to 175.0' drilled with tricone bit to 190.5'
- - - - - 200	R22-NC 5 ft 80%	20	5 2 >10 >10 NR	195.6, 195.8, 196.0, 196.2, 196.4' - Fractures (5), horizontal, rough, undulating, smooth and undulating at 196.4', open to 3/8"  196.9' - Fracture or mechanical break, rough, undulating, open 3/8"  197.4-197.6' - Fractures, open, fragments up to 1"  197.8-199.5' - Fracture zone, rough, undulating, numerous fragments, up to 1-1/2"		Limestone  195.5-196.3' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl reaction, weak (R2), thin irregular dark laminations, 20% coverage of <1/16" voids on surface, few larger voids  196.3-199.5' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak (R2), moderately fossiliferous, 60% coverage of <1/16" voids on surface, cavities (up to 3/8") over 10% of surface  No Recovery 199.5-200.5'	
-157.7 -157.7 - - - - - - - - - - - - -	200.5		NR			- No Recovery 199.5-200.5'  Bottom of Boring at 200.5 ft bgs on 3/8/2007	R22: 17 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-18A	SHEET	1	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.2 N, 458049.3 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER LEVELS: 2.0 ft bgs on 3/25/07 STA					START : 6/14/2007 END : 6/15/2007	LOGGER:	D. \	Whitaker
					OOU DECODIDEION		П	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS			SYMBOLIC LOG	
JEEL TON	RECOVERY (ft)		12011120210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		5	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINEI	RALOGY	WB	INSTRUMENTATION
필징급				(N)			်	
42.1								06/14/07 Drill 10.0' pilot hole, install 10.0' of SW (6") casing
l _								SW (6") casing – Blind drill to 25.0'
l _	]							_
l _								_
								Water level obtained from boring A-18
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						1		_
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32.1	1					_		
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-18A	SHEET	2	OF	6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.2 N, 458049.3 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER LEVELS : 2.0 ft bgs on 3/25/07								
				STANDARD	SOIL DESCRIPTION			COMMENTS
AND (f)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COULNAME LICCO OPOLID OVARDOL COL	OD	CLO	DEDTIL OF CACING DRILLING DATE
H BE ACE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLO MOISTURE CONTENT, RELATIVE DENSITY	′ OR	30LI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERA	LOGY	SYMBOLIC LOG	INSTRUMENTATION
22.1				(. •)				
-	-					-		-
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						_		_
-						_		_
-						-		-
-	_					-		-
-						-		-
25 17.1	25.0				│ │ Fat Clay With Sand (CH)	T		<del>-</del>
-	-	1.3	SS-1	20-24-23	25.0-25.05' - light bluish gray, (5B 7/1), wet, ve high plasticity, no dilatancy, no HCl reaction, 1	ery stiff, /-		-
-	26.5			(47)	fine to fine silica sand, (slough)			-
-					Silty Sand (SM) 25.05-26.35' - yellowish gray, (5Y 8/1), wet, de	ense.		06/15/07 Install 5' more of SW casing
					fine to coarse grained sand-sized, moderate F reaction, 24% nonplastic fines, all carbonate	ici /		Begin split spoon sampling at 25.0' - 09:00 Pull out split spoon 25.0-26.5' _
_					reaction, 24 % nonplastic lines, all carbonate			_
_						-		-
-	-					-		-
-						-	•	-
30 12.1	30.0	0.5	SS-2	50/5.5	Silty Sand (SM)			
-		0.0	002	(50/5.5")	30.0-30.5 - Same as 25.05-26.35' except gray orange, (10YR 7/4)	ish /	1143	decide to start rock coring
-	-				Begin Rock Coring at 30.5 ft bgs	/ -		-
_	1				See the next sheet for the rock core log	_		-
						_		
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PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-18A

SHEET 3 OF 6

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.2 N, 458049.3 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.0	ft bgs	on 3/	25/07 START : 6/14/2007 END : 6/	15/20	7 LOGGER : D. Whitaker		
≥0.00	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.	
	30.5					No Recovery 30.5-35.5'	09:55 Begin rock coring	
- - - - - - 35 7.1	R1-NQ 5 ft 0%	0	NR		-	-	Driller's Remark: Sand layer that washed out (30.5-35.5') - felt resistance during drilling	
-	35.5				ш	_ Limestone	1	
-			2	36.2' - Fracture (2), 60 deg and 70 deg, rough, undulating, open (1/8"), intersecting	Ħ	<ul> <li>35.5-39.5' - pale olive, (10Y 6/2),</li> <li>very fine to fine grained, moderate to strong HCl reaction, very weak (R1),</li> </ul>	-	
-	R2-NQ		>10	37.12-37.45' - Fracture zone		<ul> <li>15% surface voids (&lt;1/16")</li> <li>35.5-38.5', 40% surface voids from</li> <li>38.5-38.5', many cavities up to</li> </ul>	SC-1 collected at 37.45-	
-	5 ft 80%	60	0	38.55-38.75' - Fracture zone		<ul> <li>3/16"x9/16", many fossil molds with minor silt infill, sporadic black (organic) material up to 3/16", trace</li> </ul>	38.55'	
-				38.95' - Bedding plane or mechanical break, horizontal, rough, undulating, tight	Ħ	(few) fossil casts  No Recovery 39.5-40.5'	- R2: 8 minutes	
40 2.1	40.5		NR	-	Ħ	Limestone		
-			0			- 40.5-42.9' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, weak (R2), extremely weak	- Core run times not	
-	DO NO		>10	41.65' - Bedding plane or mechanical break, 5 deg, rough, undulating, open (1/8") 42.1-42.53' - Fracture zone	F	rock (R0) from 42.2-42.9', 40.5-42.2' 40% small surface voids (<1/16"), many small cavities up to 3/16" in	recorded beyond run R2-	
-	R3-NQ 5 ft 48%	31 2		42.67' - Fracture, horizontal, rough, stepped, open (1/2"), intersecting		diameter, few fossil molds and casts, moderately fossiliferous, 42.2-42.9 5% surface voids and 1/16" infill into		
-			NR		Ħ	void space, few fossil molds No Recovery 42.9-45.5'	1	
45 -2.9	45.5			_				
-			2	46.4, 45.9, 46.95, 47.5, 48.3, 48.5, 49.1,	Ħ	Limestone  45.5-50.4' - yellowish gray, (5Y 7/2), strong HCI reaction, extremely weak	_	
-			2	49.45, 50.15' - Mechanical break, <5 deg, rough, planar, silt infilling, tight		(R0), 25-40% surface voids (<1/16")  variable over core, void infill, many cavities up to 3/16"x3/8", many black	_	
-	R4-NQ 5 ft 98%	63	2		E	(organic) oblong and spherical fossils up to 3/16" in diameter, horizontal black laminations from 47.4-47.8'	_	
-			3			varying in size up to 3/16" thick, fine grained with local medium grained accumulations	_	
50 -7.9	50.5		1	_			_	



338884.FL A-18A

SHEET 4 OF 6

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.2 N, 458049.3 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS: 2.0	ft bgs	s on 3/	25/07 START : 6/14/2007 END : 6/	15/200	7 LOGGER : D. Whitaker	
≥∩≘	_ (9			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	I.R.U.	(%) O	FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥMΕ	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ООШ	075	ď	LLL NR/	THISTARESO, SOLA FISE STRAINES, FARE TISTARESO	S	No Recovery 50.4-50.5'	
1 4			0		凵	- Limestone	-
1 4				54.5.50.01. Marchanical basel, 00 day field	₽	50.5-55.3' - pale yellowish brown,	-
			2	51.5, 53.8' - Mechanical break, 60 deg, tight 51.85' - Mechanical break, 50 deg, tight	Щ	(10YR 4/2), moderate HCl reaction, extremely weak (R0), small surface	_
					ш	voids (<1/16") 15-25% variable over	_
	R5-NQ 5 ft	73	3	52.85, 53.85, 53.95, 54.5' - Mechanical	┟┼┨	core length, many cavities up to 9/16"x3/16", trace black elongate	_
	96%			break, horizontal, tight	用	shaped material (organics) up to	_
			3		ቯ	9/16"x1/16", trace black lineations from 51.65-51.85', fine grained with	_
			٥		Н	local medium grained accumulations	
55			1				1
-12.9	55.5		NR.	_	Ш	- No Recovery 55.3-55.5'	
1				55.75, 55.9, 56.15, 56.63, 57.02, 57.4, 57.9,	Ы	Limestone	]
1 1			3	58.4, 59.08' - Mechanical break, <10 deg,	$\mathbb{H}$	55.5-60.5' - Same as 50.5-55.3'	1
1 1				rough, planar, tight	Ħ	<ul> <li>except 5-15% surface voids (&lt;1/16"), many black lineations throughout,</li> </ul>	1
1 1			3		╁┼	few cavities up to 1/8" diameter	1
1 1	R6-NQ			57.6' - Mechanical break, 50 deg, rough,	Ш	-	1
1 1	5 ft 100%	82	3	planar, tight	ш	-	1
1 1	10070				Ш	-	-
1 -			1		+	-	1
60					Ħ	-	1
-17 9	00.5		0	_	Ш	<del></del>	_
1 +	60.5				╁┼┤	Limestone	-
1 -			3	61.0' - Bedding plane or mechanical break,	ш	- 60.5-61.1' - pale yellowish brown,	-
1 -				horizontal, rough, undulating, tight		(10YR 4/2), moderate HCl reaction, weak (R2), hard, moderate density,	-
1 -			2	61.1' - Mechanical break, 40 deg, rough, undulating, tight	++	<ul> <li>fossiliferous, small voids and fossil</li> </ul>	-
-	R7-NQ			61.5, 61.9, 62.46, 63.05, 64.0, 64.6, 65.23' -	$\Box$	_ molds (1/16"-1/8") over 10-15% of surface	-
1 -	5 ft	88	2	Mechanical break, <10 deg, rough, planar to undulating, tight	丗	- Limestone	-
-	100%			anddaing, iight	╂┼┨	61.1-65.5' - pale yellowish brown, (10YR 4/2), moderate HCl reaction,	-
1 -			2		Ш	extremely weak to weak (R0 to R2),	-
					団	hard, localized zones of small voids (1/16"-1/8") up to 15% of surface,	-
65 <u> </u>			1	_	H	— very sparse black organic inclusions	_
-22.9	65.5				用	Limantana	-
			1		H	Limestone - 65.5-70.5' - moderate yellowish	] _
				00.51.5 1 (0).50 1 1 1	버	brown, (10YR 5/4), moderate to	] _
			3	66.5' - Fracture (2), 50 deg, rough, stepped, tight, intersecting	Щ	strong HCl reaction, extremely weak to very weak (R0 to R1), some of the	]
				66.9, 67.13, 67.8, 69.13, 70.2' - Bedding	Щ	rock from 68.0-70.5' poorly	
	R8-NQ 5 ft	86	1	plane or mechanical break, <5 deg, rough, planar to undulating, tight to open (up to 1/4")	Ш	fossiliferous, up to 3/16" thick, sparse very thin (<1/16" thick) lineations, few	]
	100%	00	'	planta to unduduing, agric to open (up to 174)	$\Box$	cavities up to 1/16"x1/8", few black	
]			1		岸	blebs up to 3/16" diameter, mostly fine grained	]
7			L' l		Ш		SC-2 collected at 69.12-
70					Ш		70.23'
-27.9	70.5		2	_	Ш		]



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SHEET 5 OF 6

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.2 N, 458049.3 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS: 2.0	ft bgs	s on 3/	25/07 START : 6/14/2007 END : 6/	15/200	D7 LOGGER : D. Whitaker	
≥∩ ≘	_ (9			DISCONTINUITIES	ဖွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A B B A C A C A C A C A C A C A C A C A	B.F.A	(%) O	F.0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	]   	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
E R	ORE ING	Ω	AC.	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	SHR	ď	F E	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	
			2	70.25' - Fracture, 70 deg, rough, planar	Ш	Limestone - 70.5-74.75' - moderate yellowish	11:40 20.0' More HW
				71.1, 72.15, 72.25' - Fracture, 50 deg,	Ш	brown, (10YR 5/4), strong HCl	casing put in to 50.0'
				smooth, undulating, open (up to 1/4")	Н	reaction, weak (R2), 25% surface	<u> </u>
-			2	71.2' - Bedding plane, horizontal, rough, planar, black staining, open (1/8")	Н	<ul> <li>voids (&lt;1/16") from 70.5-73.0', 50% surface voids (&lt;1/16") from</li> </ul>	
-	R9-NQ			72.6' - Fracture (2), 60 deg and 5 deg, rough,		73.0-74.75', many cavities up to 3/8",	-
_	5 ft 85%	52	3	undulating, tight, intersecting	₩	<ul> <li>very fossiliferous, many molds, casts, trace black (organics) lineations</li> </ul>	-
-	65%			73.03' - Mechanical break or bedding plane, rough, planar, tight to open (1/16")	ш	_ trace black (organics) inteations	-
-			6	73.9, 74.0, 74.15, 74.3, 74.5, 74.6' - Bedding	ш	_	-
_			>10	plane, <10 deg, rough, undulating to stepped,	$\vdash$	_	-
75 -32.9			NR	open (up to 3/4") 74.6-74.75' - Fracture zone	甘	No Recovery 74.75-75.5'	
-52.9	75.5				Н	Limestone	-
-			2	75.5-75.6' - part of core is fractured 75.9, 76.6' - Fracture (2), 50 deg, rough,	Ш	<b>Limestone</b> - 75.5-78.85' - Same as 70.5-74.75'	-
_				planar, open (up to 3/4")	Ш	except extremely weak (R0), black	_
_			>10		Н	organic material up to 1"x1/8"	_
			. 10	76.95-77.3' - Fracture zone	Я	_	_
	R10-NQ 5 ft	33			Ш		
	67%	33	5	78.05, 78.2, 78.3' - Bedding plane or	Ш		
				mechanical break, horizontal, smooth, undulating, tight to open (1/16")	Ш		
				78.45' - 20 deg and 70 deg, rough,	Ш	No Recovery 78.85-80.5'	1
80			NR	undulating, tight to open (1/8"), intersecting	Н	_	1
-37.9	80.5			_	ш		
-	00.5		>10	80.5-80.9' - Fracture zone	╁┼	Limestone	-
_					ш	<ul> <li>80.5-80.9' - Same as 75.5-78.85'</li> <li>except pale olive, (10Y 6/2)</li> </ul>	-
_					ш	No Recovery 80.9-85.5'	-
-					ш	_	-
_	R11-NQ				$\vdash$	_	-
_	5 ft	0	NR		甘	_	-
_	8%		INIX		╁┼┤	_	-
_					ш	_	-
-					口	_	-
85 <u>-</u>				_	╆┩	<u> </u>	_
-72.3	85.5				H	Limestone	_
			1		H	Limestone  - 85.5-88.1' - light olive gray to dusky	_
				86.15' - Mechanical break or bedding plane,	Н	yellow, (5Y 5/2 to 5Y 6/4), strong HCl	_
1 _			<sub>1</sub>	30 deg, rough, undulating, tight	Ш	reaction, weak (R2), 87.7-88.1' extremely weak rock (R0), 40-50%	SC-3 collected at 86.9-
				86.9' - Mechanical break or bedding plane, horizontal, rough, undulating, tight	団	surface voids (<1/16") many cavities	87.72' _
	R12-NQ 5 ft	43	>10	87.72-88.1' - Fracture zone	Н	up to 3/8"x3/16", highly fossiliferous, many (>5) molds, few casts, minor	
	52%	70			H	recrystallization	
1 7						No Recovery 88.1-90.5'	]
1 7			NR		Н		]
90					Ш		
-47.9	90.5			_	Ш		



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722992.2 N, 458049.3 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.0	) ft bg:	s on 3/	/25/07 START : 6/14/2007 END : 6/	15/200	D7 LOGGER : D. Whitaker	
>00	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
ANE ANE	AN. ∀AN. %		ES	DESCRIPTION	2.00	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURF	SORI	ROI	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	0					Limestone	
-	-		>10	90.78' - Mechanical break or bedding plane, - horizontal, rough, stepped, tight		<ul> <li>90.5-95.0' - Same as 85.5-88.1' except very fossiliferous with many</li> </ul>	-
_			4.0	91.3-92.4' - Fracture, 85 deg, rough, undulating, fragments along fracture plane	Н	cavities up to 1-3/4"x1-3/16", minor	-
_			>10	91.3, 91.8' - Bedding plane or mechanical		<ul> <li>silt infill, secondary carbonate crystals within cavities and voids</li> </ul>	-
	R13-NQ 5 ft	57	4	break, 35 deg, rough, stepped, tight 91.9' - Fracture, smooth, stepped, missing		space present, minor black staining in some cavities	_
_	90%	31	_	part of fracture 92.6, 92.7, 93.4, 94.25' - Bedding plane, <25	H	-	_
_			2	deg, rough, stepped, fragments in fractures,		_	_
_				open (up to 1") 93.8' - Bedding plane or mechanical break,		_	_
95 <u> </u>			0	30 deg, rough, undulating, tight	H	No Recovery 95.0-95.5'	_
32.3	95.5		NR	-	凵	Limestone	-
-	-		1	95.95' - Bedding plane or mechanical break,	丗	<ul> <li>95.5-97.35' - Same as 85.5-88.1'</li> <li>except 15-25% surface voids</li> </ul>	-
-				10 deg, smooth, undulating, tight 96.6' - Bedding plane, smooth, undulating,	Ш	(<1/16")	-
_			1	open (3/4-2"), fragments in fracture, also 50 degree fracture smooth, undulating, black	Ш		-
_	R14-NC			staining	Ш	No Recovery 97.35-100.5'	-
	5 ft 37%	32			Ш	_	
_			NR	_		_	_
_				-	Ш	_	_
100_ -57.9				_		_	6/15/07 15:30, Total depth
-	100.5					Bottom of Boring at 100.5 ft bgs on	of boring 100.5'
-				-	H	- 6/15/2007	-
-	-			-	1	_	-
_				-	1	_	-
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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical

	. =\ /=\ 0	0001	0.101	2/27	TIPE (1997)
WATER	LEVELS	: 2.0 ft bg	gs on 3/2:		START : 3/23/2007
<b>≥</b> Ω€	044451	INITEDIT	1 (4)	STANDARD PENETRATION	SOIL DESCRIF HON O
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H B		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
ERE			#TYPE	6"-6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
43.1	0.0			(14)	Poorly Graded Sand With Silt And Gravel (SP-SM)
-	0.0				$\setminus$ 0.0-0.5' - grayish yellow, (5Y 8/4), dry, loose, fine to $\int \frac{1}{1} \frac{1}{1} \frac{1}{1}$
-		1.5	SS-1	3-3-3-3 (6)	\coarse grained sand and gravel, 11% fines, limestone \
_				(0)	Poorly Graded Sand (SP)
-	2.0				│ 0.5-1.5' - dusky brown to pale yellowish brown, (5YR │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │
-					2/2 to 10YR 6/2), moist, loose, fine grained, trace Water level at 2.0' below ground surface nonplastic fines, up to 25% organics, wood fragments
_		1.2	SS-2	2-4-4-6	\\0.5-0.8'
_		'	00 2	(8)	Silty Sand (SM)   2.0-2.5' - grayish brown, (5YR 5/2), wet, loose, fine   -
_	4.0				grained, 20% nonplastic fines, fines may be organics
					Poorly Graded Sand With Silt (SP-SM)
5		۱.,	00.0	3-3-4-4	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
38.1		1.4	SS-3	(7)	Silty Sand (SM)
-	6.0				\[ \lambda 4.0-5.4' - light gray, (N8), wet, loose, fine grained, \[ \lambda 20-25\% low plastic fines, trace fine sand-sized black \]
-					minerals / Till
-				2-2-1-0	Silty Sand (SM) 6.0-7.2' - light gray to medium gray, (N7 to N6), wet,
-		1.6	SS-4	(3)	very loose, fine grained, 20% low plastic fines
-	8.0				Lean Clay With Sand (CL)
-	0.0				7.2-7.6' - medium gray to dark gray, (N4 to N3), wet, soft, low to medium plasticity, slow dilatancy, 15% fine
-				0.0740	∏∖grained sand, 5% wood and organics //चिं∏∏
-		0.9	SS-5	2-3-7-12 (10)	Fat Clay With Sand (CH)  8.0-8.4' - medium gray to dark gray, (N4 to N3), wet,
-				(10)	\stiff, high plasticity, no dilatancy, 15-20% fine grained     -
10 33.1	10.0				sand, 5% wood fragments
-					Silt With Sand (ML)   8.4-8.9' - grayish orange, (10YR 7/4), wet, stiff,   -
_		0.9	SS-6	3-47-11-9	¬√nonplastic, rapid dilatancy, moderate HCl reaction, //-
_				(58)	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
_	12.0				│
_					\dense, moderate to strong HCl reaction, fine to coarse gravel-sized up to 2", 25% fine to coarse
_		0.9	SS-7	6-12-8-10	├ ∖grained sand, 15-20% low plastic fines
_				(20)	Silt With Sand (ML) 12.0-12.9' - grayish orange, (10YR 7/4), moist to wet,
-	14.0				_ very stiff, nonplastic, rapid dilatancy, moderate HCl
-					\reaction, 5-10% fine grained sand, 5% medium to \reaction, 5-10% fine grained sand
15		0.7	SS-8	3-8-9-8	Limestone And Silt (ML)
28.1		0.,		(17)	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	16.0				angular to subrounded limestone fragments, with silt
					that is grayish yellow (5Y 8/4), wet, very stiff, 10-15% / -
		1.0	SS-9	9-13-18-30	Sift (ML)
		1.3	33-9	(31)	16.0-17.3' - yellowish gray, (5Y 7/2), wet, hard,
-	18.0				\ nonplastic, rapid dilatancy, moderate HCl reaction,
-					Limestone Fragments
1 -				12-18-25-13	\ \ 18.0-18.2' - moderate to dark yellowish orange, (10YR / -
-		1.4	SS-10	(43)	gravel-sized, angular fragments up to 2"
20					Silt (ML) 18.2-19.4' - Same as 16.0-17.3'
20					\10.2-13.4 - Qaille dS 10.0-17.3 /



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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.0 ft b	gs on 3/23	3/07	START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb
300				STANDARD	SOIL DESCRIPTION COMMENTS
AND AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, 의 DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
23.1	20.0			, ,	Silt (ML)
		1.4	SS-11	12-19-17-17	20.0-21.4' - Same as 16.0-17.3' except 10-15% fine grained sand, trace medium to coarse grained sand
_		'	33-11	(36)	<u></u>
-	22.0				
-					Sandy Silt (ML)
-		1.7	SS-12	38-43-38-44 (81)	\nonplastic, rapid dilatancy, moderate HCl reaction, \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-				(01)	Silt (ML) -
-	24.0				22.5-23.7' - Same as 22.0-22.5' except 10-15% fine grained sand
25	-			37-27-20-31	Silf (ML)
18.1		1.4	SS-13	(47)	24.0-25.4 - Same as 22.5-25.7
-	26.0				
-					Sandy Silt (ML) 26.0-27.4' - Same as 22.0-22.5'
		1.4	SS-14	21-18-16-11	20.0-27.4 - Same as 22.0-22.5
_		'	00-14	(34)	<u> </u>
_	28.0				One d. Oile (MI)
-					Sandy Silt (ML) 28.0-29.7' - yellowish gray, (5Y 7/2), moist to wet,
-		1.7	SS-15	4-3-2-17 (5)	medium stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 32% fine to coarse grained sand
-	-			(0)	-         -
30 <u> </u>	30.0				Sandy Silt To Silt (ML)
-	1	1.4	SS-16	10-20-21-50/3	30.0-31.4' - yellowish gray, (5Y 7/2), wet, hard, -
-		'	33-10	(41)	reaction, 25-30% fine to coarse grained sand,
	31.8 32.0				decreasing to 10-15% fine grained sand at 30.0-30.3', / thin laminae, white calcareous stringers <1/16" thick, /
	32.4	0.3	SS-17	50/5 (50/5")	oriented horizontal to 30 deg Sandy Silt With Limestone (ML)
-				( (00/0 )	│ 32.0-32.3' - dark yellowish orange, (10YR 6/6), wet, │
-					hard, nonplastic, rapid dilatancy, moderate HCI reaction, 25-30% very fine to coarse grained sand,
-	34.0	0.4	SS-18	50/5	20% disc-shaped limestone fragments up to 1/10"
	34.4	0.4	33-10	(50/5")	Limestone And Sandy Silt (GM)  34.0-34.4' - Same as 32.0-32.3' except low plasticity.
35 8.1					\mild to moderate HCl reaction, 75% fine to coarse / -
-	36.0				\grained sand and fine to coarse gravel-sized; 25% silt / -
-	36.1	0.1	SS-19	50/1 (50/1")	Limestone Fragments  SPT discontinued at 36.0' Surface casing set to 36.0'
-	1			(30/1)	\strong HCI reaction, 3 coarse gravel-sized pieces /
-	]				recovered
					See the next sheet for the rock core log
-					
-	-				-
-	-				
40	-				-



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 2.0	ft bgs	s on 3/	23/07 START : 3/23/2007 END : 3	/26/20	07 LOGGER : R. McComb	_
≩O⊋	<u>(</u> %			DISCONTINUITIES	92	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - - - 40 3.1	36.0 R1-HQ 5 ft 20%	0	>10 NR	36.0-37.0' - Fracture zone, rough, undulating, rounded limestone fragments, some surface staining		Limestone  36.0-36.5' - yellowish brown, (10YR 6/2), fine grained, strong HCI reaction, very weak to weak (R1 to R2)  36.5-37.0' - pale yellowish brown, (10YR 6/2), fine to very fine grained, mild HCI reaction, extremely weak (R0), friable, voids over 80-90% of surface  No Recovery 37.0-41.0'	Driller's Remark: Soft at 40.0-41.0'  R1: 7 minutes
-	41.0				1	-	=
-	1.0		4   ope	41.1' - Fracture, horizontal, smooth, planar, open 3/8"	Ē	Limestone - 41.0-43.5' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction,	
-			2	41.35' - Fracture, <5 deg, smooth, undulating, open 3/4" 41.6-41.9' - Fracture zone, 0 to <5 deg,	Ħ	extremely weak (R0), thin bedding, very friable, thinly laminated from	-
-	R2-HQ 5 ft	35	3	rough, stepped 42.3' - Fracture, <5 deg, smooth, undulating, open 3/4"		41.3-41.55' 43.5-44.9' - yellowish gray, (5Y 7/2),	-
-	78%		3	42.7' - Fracture, horizontal, rough, planar, open 3/4"-1-3/16" 43.0, 43.9' - Fractures (2), horizontal, rough,		<ul> <li>fine grained, no to mild HCl reaction, weak to extremely weak (R2 to R0), trace organics, voids over 40-50% of</li> </ul>	-
45 -1.9 -			NR	undulating, open 3/16" at 43.0', open 3/8" at 43.9' 44.4, 44.6' - Fractures (2), horizontal, rough,	茾	surface becoming larger with depth, trace organic material     No Recovery 44.9-46.0'	R2: 2 minutes
-	46.0		4 4	undulating, open 3/16"-3/8" 44.7' - Fracture, <5 to 40 deg, rough, undulating		Limestone - 46.0-50.4' - yellowish gray, (5Y 7/2),	-
-			3	46.2' - Fracture, horizontal, smooth, planar, open 1/16" 46.4' - Fracture, horizontal, rough, undulating,	+	fine grained, no to mild HCl reaction, extremely weak (R0), trace organics, voids over 10-15% of surface	-
-	R3-HQ 5 ft	20	20 3 tig 46 un	open 3/16" 46.6' - Fracture, horizontal, smooth, planar, tight	E	-	-
-	88%			46.9, 47.15' - Fractures (2), horizontal, rough, undulating, open 1/16"-3/16" 47.30' - Fracture, <5 deg, rough, undulating,	井	-	-
50 -6.9			3	tight 47.85' - Fracture, horizontal, smooth,	厂	<b>—</b>	R3: No runtime recorded
-	E1.0		NR	undulating, open <1/16" 48.03, 48.55' - Fractures (2), horizontal,	世	No Recovery 50.4-51.0'	-
-	51.0		>10	smooth, planar, tight 48.85, 49.35' - Fractures (2), smooth, planar to undulating, tight	丰	Limestone  51.0-53.3' - yellowish gray, (5Y 7/2),	-
-			>10	49.60' - Fracture, <5 deg, smooth, stepped, tight 50.0' - Fracture, <5 to 30 deg, rough,	E	fine grained, mild HCl reaction, very weak to weak (R1 to R2), voids on 15-25% of surface, cavity up to 3/8"	-
-	R4-HQ 5 ft	0	>10	stepped, open 3/8" 50.2' - Fracture, rough, planar to undulating,	井	length at 52.3'  No Recovery 53.3-56.0'	
- 55_ -11.9 -	46% 56.0		NR	open 3/8" 50.4' - Fracture, horizontal, smooth, planar, open 51.0-51.7' - Fracture zone 51.7' - Fracture, 80 deg, rough, undulating, 0.4' long, open	- - - - - - - - - - - - - -	-	R4: 4 minutes
							1



PROJECT NUMBER:

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SHEET 4 OF 14

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

00.10			<u> </u>	PIENT : CIVIE 330X 3/N 340233, ITIUU TOLALY, FIQ LOOIS, FIV		·9	ORIENTATION : Vertical
WATER	LEVELS : 2.0	ft bg	s on 3	/23/07 START : 3/23/2007 END : 3/	26/20	D7 LOGGER : R. McComb	
	<u></u>			DISCONTINUITIES	'n	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
의 의 의	NĀ.K	(9)	FRACTURES PER FOOT		윽	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
FAF	R F S	(%) Q	달	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOI	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
E SE	유지의	Ø	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	₹	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ООШ	074	ď	╙┺		S		
				52.9' - Fracture zone, <5 to 90 deg, rough,	Н	Limestone	
			1	undulating 56.6' - Fracture zone, 80 to 90 deg, rough,	1	<ul> <li>56.0-60.9' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very</li> </ul>	1
-				undulating	1	weak to weak (R1 to R2), voids	1
_			1	anadating	₽	- variable from 1-2% to 20-25% of	_
					$\mathbf{h}$	surface	
1 7	R5-HQ			58.0' - Fracture, 30 deg, smooth, planar,			SC-1 collected at 58.0-
I -	5 ft	87	0	open	╨	_	59.3'
-	98%				+	_	-
			2	59.3' - Fracture, horizontal, smooth, planar,		<u>_</u>	_
60			-	open	$\vdash$		
-16.9				59.9' - Fracture, horizontal, smooth, planar,	1	_	R5: 4 minutes
-			1	open <1/16"	+		1
1 4	61.0		NR.	60.5' - Fracture, horizontal, smooth, stepped, open 3/8"	╨	No Recovery 60.9-61.0'	1
			3	61.3, 61.75' - Fractures (2), horizontal,		Limestone	
1 7			ا	smooth, planar, open 3/16"	1_	61.0-66.0' - Same as 56.0-60.9'	
I -				omeen, planal, epen er le	╁┷	except cavities vary from 15-20%	-
-			2		-Ш	_ decreasing with depth, trace organics	-
				62.8' - Fracture, horizontal, smooth, planar,	ᅪ	as thin discontinuous laminae	_
	R6-HQ			tight	-		
1 -	5 ft 100%	90	0	63.0' - Fracture, horizontal, smooth, stepped,		<del>-</del>	1
-	100 /6			tight	╁	_	1
			1	64.4' - Fracture, 50 deg, smooth, stepped,		_	<b> </b>
65				open			SC-2 collected at 64.5- 65.5'
-21.9				_	$\vdash$		R6: 4 minutes
-			1	65.5' - Fracture, horizontal, smooth,		_	Tto: 4 minutes
-	66.0			undulating, open	╨	Limestone	-
			2	66.1' - Fracture, horizontal, smooth, planar,	┢	- 66.0-68.5' - Same as 61.0-66.0'	
			-	open		00.0 00.0 Came as 01.0 co.0	
				66.8' - Fracture, <5 deg, smooth, stepped, open	Ш		1
-			3	67.03' - Fracture, <5 deg, smooth,	+-	<u>-</u> T	-
-	5=			undulating, tight	$\blacksquare$	_	-
	R7-HQ 5 ft	65	1	67.35' - Fracture, horizontal, smooth, planar,	┵	_	_
	97%	00	'	open		68.5-70.85' - yellowish gray, (5Y 7/2),	
1 -				67.9' - Fracture, 0 to 50 deg, rough, stepped, open		- very fine to fine grained, no to	1
-			2	68.45' - Fracture, 70 deg, smooth, planar,	╨	moderate HCl reaction, very weak to weak (R1 to R2), some strong	1
70			<u> </u>	tight	╨	<ul> <li>hydrochloric acid reaction in some</li> </ul>	SC-3 collected at 69.7-
-26.9			0	69.6, 69.7' - Fracture (2), 0 to 50 deg, rough,	$\bot$	cavities, voids over 20-25% of	70.85' R7: No runtime recorded
	71.0			undulating, open	$\vdash$	surface, trace cavities to 3/8"x3/16"	Nr. No fulfilline recorded
1 7			NR.		口	No Recovery 70.85-71.0'	1 1
-			2	71.25' - Fracture, horizontal, smooth,	╁	_ <b>Limestone</b> 71.0-71.3' - Same as 68.5-70.85'	1
				undulating, tight to open 3/16" 71.8' - Fracture, horizontal, smooth, stepped,	上	- 71.3-73.5' - yellowish gray to dusky	1
			0	tight, organic black covering 15-20% of	Ш	vellow. (5Y 7/2 to 5Y 6/4), very fine to	
1 7			ا ا	surface	┰	fine grained, mild to moderate HCI	1
_	R8-HQ				亡	- reaction, very weak to weak (R1 to	1
-	5 ft	88	1	70 FFL Franking having 1 1 1 1	╨	R2), laminated in zones with black organic material, fossil plant	-
	100%			73.55' - Fracture, horizontal, smooth, planar,	╁┼	- impression along fracture and	]
				open		bedding planes, voids <5%, trace	
75			1		╨	cavities	1
-31.9			$\vdash$	74.8' - Fracture, horizontal, smooth, –	+	— 73.5-76.0' - Same as 68.5-70.85'	SC-4 collected at 74.9-
-			2	undulating, tight	二	<u></u>	75.7'
	76.0				$oldsymbol{oldsymbol{oldsymbol{\sqcup}}}$		R8: 9 minutes
L		L	L		1		<u>                                       </u>



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER LEVELS: 2.0 ft bgs on 3/23/07				23/07 START : 3/23/2007 END : 3/	26/200	7 LOGGER : R. McComb		
≯O ₽	(%)			DISCONTINUITIES	ا <sub>ي</sub> [	LITHOLOGY	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.	
-			>10	75.6, 75.9' - Fractures (2), <5 deg, rough, stepped 76.0-77.5' - Fracture zone		Limestone 76.0-77.5' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to moderate HCl reaction, very weak to	-	
-	R9-HQ		NR			<ul> <li>weak (R1 to R2), voids on 15-25% of surface, friable</li> <li>No Recovery 77.5-78.5'</li> </ul>	-	
_	5 ft 67%	30	1			Limestone 78.5-80.35' - yellowish gray, (5Y 7/2), fine to very fine grained, no to mild	SC-5 collected at 78.5- 79.65' -	
80 -36.9				NR	79.65, 80.0' - Fractures (2), <5 deg, rough, stepped, open 3/8-3/4"		HCI reaction, becoming very soft  — (clay like) at base, organic material in clayey to sandy limestone material  No Recovery 80.35-81.0'	R9: 3 minutes
-	81.0		0			Limestone  - 81.0-86.0' - yellowish gray, (5Y 7/2), very weak to weak (R1 to R2), voids	SC-6 collected at 81-82.75'	
-			1	82.7' - Fracture, 45 deg, rough, stepped,		over 30-40% of surface, rare cavities up to 3/16", friable at 83.5-85.6', with interbedded clay to sand sized		
_ _	R10-HQ 5 ft 100%	46	>10	open, dark brown clay over 50% surface 82.9-83.1' - Fracture zone, <5 deg, undulating, thin brown clay lined <1/16", thick covering 100% surface		carbonate grains, some organic - material -	-	
85 -41.9			>10	83.7-86.0' - Fracture, <5 deg, rough, stepped, open, various fractures having different orientations		- 	R10: 7 minutes	
-	86.0		>10	86.1' - Fracture, 30 to 40 deg, smooth,		- 86.0-89.0' - Same as 81.0-86.0'	- -	
_			3	planar, open 86.4' - Fracture, horizontal, rough, stepped 86.95' - Fracture, 30 deg, rough, stepped,		<ul> <li>except cavities up to 3/4" over 1-5%</li> <li>of surface</li> </ul>	SC-7 collected at 87.3-	
-	R11-HQ 5 ft	48		tight	H	- -	88.7'	
-	79%		>10	88.65' - Fracture, 60 deg, rough, planar 88.9-89.1' - Fracture zone, <5 deg, rough, stepped, open		89.0-89.95' - yellowish gray with light olive brown mottling, (5Y 7/2 with 5Y	-	
90 <u> </u>	91.0		NR	89.4' - Fracture zone, 0 to 60 deg, rough, undulating, tight		5/6), mild to moderate HCl reaction, voids on 5-10% of surface, rare small cavities, friable No Recovery 89.95-91.0'	R11: 9 minutes	
_	01.0		2	91.1' - Fracture, horizontal, smooth, planar, open 91.3' - Fracture, 10 deg, smooth, planar, tight		Limestone 91.0-91.3' - moderate olive brown to olive gray, (5Y 4/4 to 5Y 3/2), fine to	-	
_			1	92.8' - Fracture, 90 to 80 deg, rough, planar,		very fine grained, moderate HCl reaction, extremely weak (R0), organics		
_ _	R12-HQ 5 ft 100%	56	2	tight 93.5' - Fracture, horizontal, smooth, planar, open		91.3-94.5' - Same as 86.0-89.0' - except thinly laminated at 91.3-91.4', with organics	-	
95_ -51.9			2	93.9' - Fracture, horizontal, rough, planar, open 94.6' - Fracture, 80 deg, rough, planar 95.1-95.65' - Fracture, horizontal, smooth,		- 	SC-8 collected at 94.6- 95.4'	
_	96.0		10	planar, open	H	-	R12: 9 minutes _	



PROJECT NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	ft bgs	s on 3	/23/07 START : 3/23/2007 END : 3/2	26/20	07 LOGGER : R. McComb	
≥∩≘	(9)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
100 -56.9	S H W R13-HQ 5 ft 96%	ж	3 1 2 NR	THICKNESS, SURFACE STAINING, AND TIGHTNESS  96.4' - Fracture, 0 to 90 deg, rough, undulating, open 96.7' - Fracture, horizontal, smooth, planar 96.8' - Fracture, continuation of 96.4' 97.8' - Fracture, 30 deg, smooth, planar 98.1' - Fracture, horizontal, smooth, planar, tight 98.85' - Fracture, horizontal, rough, undulating, tight 99.35, 100.35' - Fractures (2), horizontal, rough, undulating, open, silty infilling covering 2-3%  100.65' - Fracture, horizontal, rough,	AS TOTAL TOT	CHARACTERISTICS  Limestone 94.5-96.0' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, very weak to medium strong (R1 to R3), voids over less than 10% of surface, trace organics 96.0-97.2' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very weak to weak (R1 to R2), laminated, voids over 25-30% of surface, cavities over 10-15% of surface, near base of interval, possible bioturbation at 96.5' 97.2-99.1' - yellowish gray, (5Y 7/2), very fine grained, weak to medium strong (P3 to R2), thinky laminated	SC-9 collected at 99.35-100.35'R13: 9 minutes
- - - 105 -61.9	R14-HQ 5 ft <sup>1</sup> 86%	36	0 2 1 >10 >10	undulating, open  102.35' - Fracture, 30 deg, rough, undulating, open 102.5' - Fracture, 60 deg, rough, planar, tight 103.0' - Fracture, <5 deg, rough, stepped, open		strong (R2 to R3), thinly laminated with thin (<1") softer zone where voids are more prevalent, voids generally <5% of surface, rare cavities, rare fossils 99.1-100.8' - yellowish gray, (5Y 7/2), very fine grained, moderate to mild HCl reaction, very weak to weak (R1 to R2), fossiliferous (casts/molds), increasing with depth, voids over 20-25% of surface, cavities increasing with depth  No Recovery 100.8-101.0' Limestone	SC-10 collected at 101.0- 102.35' -
- - - - 110 -66.9	106.0 R15-HQ 5 ft 1 100%	64	3 3 2 1	106.1' - Fracture, horizontal, rough, undulating, open 106.6, 106.95' - Fractures (2), <5 deg, rough, stepped, open 107.1' - Fracture, 70 deg, rough, planar, open 107.4' - Fracture, horizontal, rough, undulating, open 107.6' - Fracture, 70 deg, rough, undulating, tight 108.2, 108.5, 109.0, 110.1' - Fractures (4), <5 deg, rough, undulating, open		101.0-103.5' - Same as 99.1-100.8' except fine grained, mild HCI reaction 103.5-105.3' - yellowish gray, (5Y 7/2), fine grained, mild HCI reaction, very weak to weak (R1 to R2), some fossils (molds/casts), voids over 25-30% of surface, cavities (up to 1/16"-1/8") over 5% No Recovery 105.3-106.0' Limestone 106.0-114.7' - Same as 103.5-105.3'	SC-11 collected at 108.35- 109.8'
- - - - - 115 -71.9	111.0 R16-HQ 5 ft 1 100%	78	2 2 0 1	110.45' - Fracture, 60 deg, rough, planar, tight  111.7, 111.9' - Fractures (2), 80 deg, rough, undulating, tight fracture, extends to 112.3' 112.3' - Fracture, <5 deg, rough, undulating, open 112.45' - Fracture, 60 deg, rough, undulating, tight  114.65' - Fracture, <5 deg, smooth, undulating, open		- - - - - - - - -	SC-12 collected at 113.5- 114.7' - R16: No runtime recorded
_	116.0		2	115.02' - Fracture, 30 deg, rough, undulating, open			-



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	ft bgs	s on 3/	23/07 START : 3/23/2007 END : 3/	26/200	7 LOGGER : R. McComb	
≥೧≎	- (%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
120 -76.9	R17-HQ 5 ft 50%		2 >10 NR	115.55' - Fracture, <5 deg, rough, undulating, open 116.2, 116.4' - Fractures (2), horizontal, rough, undulating, open 117.2-117.5' - Fracture zone, 0 to <5 deg, smooth to rough, planar to stepped, open		Limestone  114.7-115.7' - yellowish gray, (5Y 7/2), fine to medium grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), 1/16" voids over 10-15% of surface, some cavities up to 3/8"-3/4" irregular shaped, irregular distribution, fossil casts/molds rare to absent  115.7-116.0' - Same as 103.5-105.3' except very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), <5% voids on surface  116.0-117.5' - Same as 103.5-105.3' except possible voids	SC-13 collected at 116.4- 117.2'  Driller's Remark: Possible void from 117.5-120.0' Lost circulation at 118.0'  R17: 5 minutes
125 -81.9	R18-HQ 5 ft 100%	63	1 1 2	121.2' - Fracture, horizontal, rough, stepped, open 121.4' - Fracture, stepped  122.75' - Fracture, 75 deg, rough, stepped, tight 123.10' - Fracture, 40 deg, rough, undulating, tight  124.4, 124.92' - Fractures (2), horizontal, smooth, planar, tight  125.45' - Fracture, <5 deg, rough, undulating, tight		No Recovery 117.5-120.0' Limestone 120.0-121.0' - Same as 103.5-105.3' except light olive brown, 15-20% cavities up to 3/8" 121.0-123.1' - Same as 103.5-105.3' except light olive gray to grayish olive, (5Y 5/2 to 10Y 4/2), fossiliferous zone (cavities) at 122.8' 123.1-124.9' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine grained, strong HCI reaction, weak to medium strong (R2 to R3), thinly laminated with <5% voids (up to 10-15%) 124.9-130.15' - light olive gray, (5Y 5/2), fine grained, moderate to mild	SC-14 collected at 123.10- 124.4' R18: 10 minutes
130 -86.9	R19-HQ 5 ft 88%	82	1 0 1 0 NR 1	126.9' - Fracture, 60 deg, rough, undulating, tight  128.5' - Fracture, horizontal, rough, stepped, open		HCI reaction, weak (R2)	Driller's Remark: Softer at 130.0' and below SC-15 collected at 128.6-130.15'  R19: 8 minutes Driller's Remark: Lost core from 130.15-130.75'
135 -91.9	R20-HQ 5 ft 100%	28	3 10 6 1	130.9' - Fracture, horizontal, smooth, undulating, open 131.15' - Fracture, vertical, rough, planar, tight 131.5' - Fracture, <5 deg, rough, undulating, open 131.7' - Fracture, 40 deg, rough, undulating, tight 132.0-133.0' - Fracture zone 133.15, 133.18, 133.22, 133.40, 133.70, 133.80' - Fracture zone, <5 deg, rough, planar 135.22, 135.52, 135.6' - Fractures (3), horizontal, smooth, planar, tight to open		130.75-131.8' - Same as 124.9-130.15' 131.8-133.35' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), no to mild HCI reaction, very weak to weak (R1 to R2), voids on 20-25% of surface, <10% cavities, trace fossils 133.35-133.5' - yellowish gray, (5Y 7/2), strong HCI reaction, weak to medium strong (R2 to R3), <2% voids, trace cavities 133.5-133.85' - Same as 133.5-133.5' except very weak (R1), laminated bedding	SC-16 collected at 133.75- 134.84'



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-19

SHEET 8 OF 14

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	ft bgs	s on 3	23/07 START: 3/23/2007 END: 3/	26/20	D7 LOGGER : R. McComb							
≥∩≘	(%)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS						
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.						
-	03#	ш	0			Limestone - 133.85-135.25' - Same as 133.35-133.5'	SC-17 collected at 136.0- 137.3' -						
-			3	137.3, 137.5' - Fractures (2), horizontal, rough, stepped, open		135.25-137.3' - Same as - 131.85-133.35' 137.3-137.9' - yellowish gray, (5Y	-						
- - -		40	NR	137.9' - Fracture, 50 deg, rough, stepped, open		7/2), fine to very fine grained, mild  HCl reaction, very weak to weak (R1 to R2), voids over 15-20% of surface, trace cavities up to 1-3/16", thinly laminated	- - -						
140_ -96.9			1	139.70' - Fracture, 50 deg, rough, stepped, open No Recovery 13	No Recovery 137.9-139.7' Limestone	R21: 6 minutes							
_			4	140.4' - Fracture, 15 deg, rough, stepped, tight	E	<ul> <li>139.7-141.0' - light gray to very light gray, (N7 to N6), very fine grained,</li> <li>weak (R2), 2-3% voids over surface,</li> </ul>	_						
-			1	140.55' - Fracture, <5 deg, rough, stepped, tight 140.56' - Fracture, horizontal, rough,		cavities over 5-10%, voids and cavities more common with depth, cavities up to 1/16"-1/8"							
-	R22-H0		>10	undulating, tight 140.72' - Fracture, 40 deg, rough, stepped, tight	H	_ 141.0-142.05' - Same as 139.7-141.0' except voids up to	]						
-		72		141.6' - Fracture, <5 deg, rough, stepped, tight 142.05-142.35' - Fracture zone, horizontal,	Ħ	10-15% of surface cavities up to 3/16", cavities interconnected 142.05-142.5' - yellowish gray to light	-						
- - 145			1	rough, stepped, open 142.5' - Fracture, horizontal, rough,	H	gray, (5Y 5/2 to N7), strong HCl reaction, weak to medium strong (R2 to R3)	SC-18 collected at 144.15- 145.05'						
-101.9 -	146.0		3	undulating, tight 142.65' - Fracture, horizontal, rough, stepped, tight 143.65' - Fracture, 0 to 20 deg, rough, planar,	Ė	142.5-142.6' - moderate olive brown, fine to very fine grained, extremely weak (R0)	R22: 10 minutes						
-	140.0		0	tight  143.95' - Fracture, 20 deg, rough, undulating, tight	Ħ	<ul> <li>142.6-143.5' - Same as</li> <li>142.05-142.5'</li> <li>143.5-144.65' - yellowish gray, (5Y</li> </ul>	SC-19 collected at 146.0- 147.3' -						
-								1	1	144.25' - Fracture, horizontal, rough, stepped, open 145.05' - Fracture, horizontal, rough,		<ul> <li>5/2), strong HCl reaction, weak (R2), voids over 15% of surface 144.65-145.05' - yellowish gray, (5Y</li> </ul>	
-	R23-HQ 5 ft	70	1	undulating, open 145.85, 145.90' - Fractures (2), 20 deg,		<ul> <li>5/2), very fine to fine grained, mild to moderate HCl reaction, voids rare to absent</li> </ul>	-						
-	100%		1	rough, undulating, open 147.3' - Fracture, 0 to 20 deg, rough, undulating, open	Ë	<ul> <li>145.05-145.4' - light olive gray, (5Y</li> <li>5/2), moderate to strong HCl</li> <li>reaction, weak (R2), voids over</li> </ul>							
150_ -106.9			2	148.55' - Fracture, 50 deg, rough, undulating, tight 149.9' - Fracture, 60 deg, rough, planar, tight	H	- 30-40% of surface, cavities over 5-10% of surface, angular to round limestone clasts of very fine grained	R23: 5 minutes						
-	151.0		2	150-150.5' - Fracture, 70 deg, rough, undulating, tight 150.95' - Fracture, 0 to 90 deg, rough,		<ul> <li>limestone</li> <li>145.4-148.1' - light olive gray, (5Y</li> </ul>	_						
-			0	undulating, tight 151.0-151.4' - Fracture, 70 deg, rough, stepped, tight	H	5/2), mild to moderate HČI reaction, very weak (R1), voids on 5-15% of surface	-						
-	R24-HQ			151.95' - Fracture, 50 deg, rough, undulating, tight	H	148.1-151.0' - Same as 145.4-148.1' except weak (R2), trace cavities up to 3/8", voids over 15-25% of surface	-						
-	5 ft 100%	82	2	153.75' - Fracture, horizontal, rough, planar, open	Ė	151.0-153.35' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild to moderate HCl reaction, medium	]						
155_ -111.9			3	154.15' - Fracture, horizontal, smooth, undulating, open	E	strong to weak (R3 to R2), voids over 5-15% of surface	SC-20 collected at 154.7-						
-111.9	156.0		0	154.30, 154.55' - Fractures (2), horizontal, smooth, undulating, tight	Ė	153.35-154.7' - fine grained, no to mild HCl reaction, very weak (R1), thinly laminated below 154.0'	156' R24: 6 minutes -						



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	ft bgs	s on 3/	23/07 START : 3/23/2007 END : 3/2	26/200	7 LOGGER : R. McComb	
≥∩≘	_ (%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE ATIC	TH,	(%) Q	750	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	S C I	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT URF LEV	ORE	Ø	ZAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	022	ď	# 5	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	, i
_			0	_	Н	154.7-156.0' - Same as - 151.0-153.35'	_
				_	Н	Limestone	_
			1	157.15' - Fracture, 20 deg, smooth, planar,	Щ	156.0-158.03' - moderate olive - brown, (5Y 4/4), fine grained, very	
			' I	tight, open <1/16", brown clay infilling <1/16" over 10%	Н	weak to weak (R1 to R2), voids on	
	R25-HQ		>10	158.02-159.0' - Fracture zone, horizontal,	$\vdash$	15-20% of surface with interlaminate zones of finer grained limestone with	
	5 ft 100%	74	>10	rough to smooth, planar to undulating, open	団	<5% voids, rare cavities	1
				to tight -	H	158.03-158.5' - yellowish gray, (5Y	1
160			2	159.4' - Fracture, horizontal, smooth, planar, tight	Ш	<ul> <li>7/2), fine grained, mild to moderate HCl reaction, weak (R2), &lt;3% voids,</li> </ul>	SC-21 collected at 159.5-
-116.9				<b>o</b>	ш	thinly laminated	160.3' — R25: 7 minutes
_	161.0		2	160.3' - Fracture, horizontal, rough, planar, - open	H	158.5-159.4' - yellowish gray, (5Y 7/2), strong HCl reaction, medium	
-	161.0			160.4' - Fracture, horizontal, rough,	口	strong (R3), <1% voids, thinly	
-			5	undulating, tight - 161.2, 161.25' - Fractures (2), 30 deg, rough,	世	<ul> <li>laminated</li> <li>159.4-161.65' - light olive gray to light</li> </ul>	-
-			$\vdash$	stepped, open	╁┼┼	olive brown, (5Y 5/2 to 5Y 5/6), fine	
-			3	161.55' - Fracture, 40 deg, rough, stepped,	曰	grained, very weak to weak (R1 to R2), voids on 25-30% of surface,	-
_	R26-HQ			open 161.65' - Fracture, <5 deg, rough, undulating,	ш	3/8" voids up to 3-5%, very thinly	-
_	5 ft	8	>10	open -	$\vdash$	laminated	-
_	100%			161.9' - Fracture, horizontal, smooth, planar, open	H	161.65-161.87' - light olive gray, (5Y 5/2), fine to very fine grained, weak	-
_			>10	162.6' - Fracture, horizontal, rough,	Ш	(R2), voids over 5-10% of surface	-
165 <u> </u>				undulating, open 162.75' - Fracture zone, 30 to 90 deg, rough, —	Н	161.87-162.2' - olive gray to medium olive brown, (5Y 3/2 to 5Y 4/4), fine	DOC: Coming to a
-121.9			4	stepped, tight	П	to very fine grained, extremely weak	R26: 6 minutes
_	166.0			162.9' - Fracture, <5 deg, rough, stepped, open	団	(R0), thinly laminated 162.2-162.72' - Same as	-
_			>10	162.9-163.5' - Fracture zone, <5 to 90 deg,	┝┼	_ 159.4-161.65'	_
_				rough, undulating to stepped, open 163.5-165.1' - Fracture zone, horizontal,	H	162.72-166.0' - yellowish gray, (5Y 5/2), fine grained, moderate to strong	
_			1	smooth to rough, planar, open	口	HCl reaction, weak (R2), voids over	_
				165.1' - Fracture, 0 to 50 deg, smooth, planar, open	Н	5-10% of surface - 166.0-166.95' - dusky yellow to light	_
	R27-HQ 5 ft	64	1	165.3' - Fracture, 30 deg, smooth, stepped,	Щ	olive brown, (5Y 6/4 to 5Y 5/6), fine	_
	100%	04	'	tight	Ш	grained, moderate HCl reaction, very weak (R1), thin laminae of extremely	SC-22 collected at 168.7-
			2	165.5, 165.8' - Fractures (2), 0 to 90 deg, rough, stepped, open	Н	weak rock (R0), voids over 5-10% of	169.7'
170			3	166.0-167.0' - Fracture zone, 0 to 40 deg,	H	surface — 166.95-168.5' - yellowish gray to light	]
-126.9			10	smooth to rough 167.15' - Fracture, 50 deg, rough, planar,	口	olive gray, (5Y 7/2 to 5Y 5/2), fine to	R27: 8 minutes
1	171.0		10	tight	世	very fine grained, laminated with very	]
				167.85' - Mechanical break 168.70' - Fracture, horizontal, rough,	Ю	<ul> <li>fine grained limestone with &lt;1% voids, rest of rock up to 15-20%</li> </ul>	]
			2	undulating, tight	ш	voids, rare cavities	1
-				169.7' - Fracture, horizontal, rough, undulating, open	丗	168.5-169.9' - yellowish gray, (5Y 7/2), fine grained, very weak to weak	1
			2	169.7-170.1' - Fracture zone, 0 to 90 deg,	H	(R1 to R2), voids over 5-10% of	1
-	R28-HQ			rough, undulating, tight - 170.1' - Fracture, <5 deg, rough, undulating,	口	surface 169.9-171.0' - yellowish gray, (5Y	
-	5 ft 100%	74	2	open -	世	7/2), fine grained, weak (R2), voids	
-	100 /0		-	170.65' - Fracture, 5 deg, rough, undulating, - tight	╁┼	over 15-25% of surface, 1/8"-3/16" cavities over 5% of surface	
- 175			5	171.55' - Fracture, horizontal, rough,	口	-	R28: 8 minutes
-131.9			$\vdash$	stepped, tight — 171.85' - Fracture, 60 deg, rough, undulating,	団	_	-
-	470.0		1	tight	╁	-	-
-	176.0			-	H	-	-
					_		



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	) ft bgs	s on 3/	23/07 START: 3/23/2007 END: 3/	26/20	07 LOGGER : R. McComb	
≥∩ ∵	(9)			DISCONTINUITIES	ق	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE ATIC	TH.,	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	O LIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT URF	ORE	Ø	ZAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	025	ď	# 5		Ś		5 1 1 1111
1 _			10	172.20' - Fracture, 50 deg, rough, undulating, tight		171.0-177.4' - yellowish gray to pale - olive, (5Y 7/2 to 10Y 6/2), fine	End drilling on 3/24/07 at 176.0' at 17:00 hrs
				172.70' - Fracture, horizontal, smooth, planar,	$\perp$	grained, moderate to strong HCl	Water level at 2.0' below
			7	infilling, tight, brown silty infilling over 5% 173.1' - Fracture, horizontal, rough,		reaction, weak (R2), generally <3-5% voids, voids up to 10-15% of surface	ground surface Begin coring at 176.0' on
			<i>'</i>	undulating, tight	Ъ	from 174.0-174.7', rare cavities up to	3/25/07, continuing to have
-	R29-HQ			173.3' - Fracture, <5 deg, rough, undulating,		3/4" to 1-3/16"	lost circulation
_	5 ft 72%	28	2	open 174.05' - Fracture, horizontal, rough,	$\vdash$	<ul> <li>Limestone</li> <li>177.4-178.5' - light olive gray, (5Y</li> </ul>	1
_	1270		>10	undulating, black stain over 5%	1	5/2), mild to moderate HCl reaction,	1
100			- 10	174.45' - Fracture, 10 deg, rough, planar, tight	$\perp$	<ul> <li>weak (R2), voids on 10% of surface, 3/4" to 1-3/16" cavities on 3-5% of</li> </ul>	1
180 <u> </u>			ND	174.7' - Fracture, <5 deg, rough, stepped,	╁	surface, thin organic laminae at	R29: 8 minutes
-			NR	open -	F	<ul> <li>177.8' inclined at 30-40 deg</li> </ul>	-
-	181.0			174.82' - Fracture, 10 deg, smooth, planar, dark brown clay over 80%, open	世	178.5-179.6' - yellowish gray, (5Y 7/2), fine grained, strong HCl	-
-			2	174.87' - Fracture, 10 deg, smooth, planar,	$\vdash$	<ul> <li>reaction, weak (R2), voids over</li> </ul>	4
-				dark brown clay over 80%, open 175.4-176.0' - Fracture, vertical, rough,	ፗ	5-10% of surface, cavities over 5-10% of surface, typically 3/8" long,	Drillorio Domori: 0-#
			>10	undulating to stepped, tight	$\vdash$	_ fossiliferous	Driller's Remark: Soft at 183.0-184.0'
_			. 10	176.3-176.8" - Fracture, 0 to 90 deg, rough,		No Recovery 179.6-181.0'	100.0 101.0
	R30-HQ 5 ft	1 14	>10	undulating to stepped, open 177.15, 177.25, 177.3' - Fractures (3), 20		Limestone 181.0-183.0' - yellowish gray, (5Y	
	96%	14	-10	deg, smooth, planar, open		7/2), fine grained, moderate to strong	
				177.5' - Fracture, <5 deg, rough, undulating, tight		HCI reaction, weak (R2), voids on 3-5% of surface, some cavities up to	
185			4	177.6' - Fracture, <5 deg, smooth,	$\vdash$	3/4" to 1-3/16" long	Ī
-141.9				undulating, open 177.75, 177.85' - Fractures (2), 20 deg,	1—	183.0-183.5' - moderate olive brown, (5Y 4/4), fine grained, very weak	R30: 8 minutes
-	186.0		2	rough, planar, open	Ħ	(R1), voids on 5-10% of surface	1
-	100.0		NR)	178.3' - Fracture, 30 deg, rough, undulating,	╁	183.5-184.2' - yellow gray to light	1
-			3	tight 178.85' - Fracture, 60 deg, rough, undulating,	$\perp$	olive gray, (5Y 7/2 to 5Y 5/2), strong HCl reaction, weak (R2)	1
_				open	仜	- 184.2-185.3' - yellowish gray,	-
_			2	181.7' - Fracture, <5 deg, rough, stepped, tight	╁	moderate to strong HCl reaction, weak (R2), voids over 28-30% of	SC-23 collected at 187.3-
_	R31-HQ			181.8' - Fracture, vertical, smooth,	F	<ul> <li>surface, cavities over 5-10% of</li> </ul>	188.6'
_	5 ft	68	3	undulating, tight 181.95' - Fracture, <5 deg, rough, stepped,	H	surface, fossiliferous 185.3-185.8' - Same as 183.5-184.2'	_
_	100%			tight	₽	No Recovery 185.8-186.0'	_
			3	182.5-182.75' - Fracture zone, rough to	口	Limestone	_
190_				smooth, various fracture plane orientations 182.5' - Fracture, <5 deg, rough, undulating, —	$\vdash$	186.0-187.0' - yellowish gray, (5Y — 7/2), very fine grained, moderate to	<u> </u>
-146.9			1	open	F	strong HCl reaction, weak (R2),	R31: 7 minutes
	191.0			182.75' - Fracture, <5 deg, rough, undulating, open	片	voids on 1-3% of surface 187.0-187.3' - Same as 186.0-187.0'	
]			9	183.0' - Fracture, <5 deg, rough, undulating,	$\vdash$	except voids increase to 15-20% with	1
1			3	open		some cavity infilling and staining on vertical fractures	SC-24 collected at 191.55-
				183.2' - Fracture, 30 deg, rough, undulating, open		187.3-189.2' - yellowish gray, (5Y	192.55'
			1	183.45-183.65' - Fracture zone	$\vdash$	7/2), strong HCl reaction, weak (R2),	1
-	R32-HQ			183.65-185.7' - Fracture, vertical, undulating to planar, tight	Ħ	voids over 1-3% of surface 189.2-190.0' - moderate olive brown,	
-	5 ft 100%	40	4	184.2' - Fracture, horizontal, rough, planar to	世	(5Y 5/6), fine grained, no to mild HCl	
-	100%			stepped 184.3' - Fracture, 50 deg, rough, stepped,	H	reaction, extremely weak to very weak (R0 to R1), voids over 40-50%	1
			>10	open	士	of surface, irregular cavities up to	-
195 <u> </u>				184.6, 185.1' - Fracture (2), 0 to 90 deg,	╂┬	3/8"-3/4"	R32: 9 minutes
.35			>10	rough, undulating 186.0-186.9' - Fracture, vertical, rough,	F	_	
	196.0			stepped, tight	H		_
ldot					1		



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	ft bgs	s on 3/	/23/07 START : 3/23/2007 END : 3/2	26/20	07 LOGGER : R. McComb	
≥ 0 ∷	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SU	SEES	R	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	λS	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-			0	186.25' - Fracture, horizontal, smooth, planar 186.8' - Fracture, <5 deg, rough, stepped, tight 187.3, 187.4, 187.55' - Fractures (3), 50 deg, rough, undulating, tight 188.6' - Fracture, <5 deg, smooth,		190.0-191.0' - light olive brown, (5Y 5/6), fine grained, no to mild HCl reaction, very weak (R1), voids on 25-30% of surface, small cavities on 1-3% of surface  Limestone	SC-25 collected at 196.0- 196.9' - -
-	R33-HQ 5 ft 96%	75	0	undulating, open 188.7' - Fracture, <5 to 90 deg, rough, stepped, open	Ħ	191.0-193.5' - yellowish gray, (5Y - 7/2), fine to very fine grained, moderate to strong HCl reaction,	
200_ -156.9			3	189.35' - Fracture, horizontal, rough, planar, open, black organics over 95% 189.5' - Fracture, horizontal, rough, undulating, open		weak (R2), trace cavities up to 3/8"-3/4" in length, voids on 10-15% of surface 193.5-193.65' - light olive brown, (5Y	R33: 9 minutes
_	201.0		4 NR 4	189.95, 190.0' - Fractures (2), horizontal, rough, planar, open 191.1' - Fracture, 50 deg, rough, undulating, open -		<ul> <li>5/6), moderate HCl reaction, very weak (R1), voids over 1-5% of surface, thinly laminated at base, trace organics</li> </ul>	
-			4	191.25' - Fracture, <5 deg, rough, undulating, open 191.5' - Fracture, 50 deg, rough, stepped, tight	Ħ	193.65-195.0' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), voids over 1-5% of surface	-
-	R34-HQ 5 ft 98%	52	2	192.55' - Fracture, 40 deg, rough, undulating, tight 193.55, 193.65' - Fractures (2), <5 deg, rough, undulating, open 193.8' - Fracture, 40 deg, smooth, undulating,		- 195.0-196.0' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCI reaction, very weak (R1), voids on 1-5% of surface 196.0-196.9' - yellowish gray, (5Y	- - -
205_ -161.9 -	206.0		0	open 193.95-196.0' - Fracture zone, various orientations, rough, open 196.9' - Fracture, <5 deg, rough, stepped		7/2), fine grained, mild to strong HCl reaction, very weak (R1), voids on 15-20% of surface, cavities over 10% 196.9-197.8' - yellowish gray, (5Y	R34: 10 minutes -
-	200.0		NR) 2	199.74' - Fracture, horizontal, rough, stepped, open 199.8' - Fracture, horizontal, rough,		<ul> <li>7/2), fine grained, strong HCI</li> <li>reaction, very weak to weak (R1 to R2), voids over 1-5% of surface,</li> </ul>	SC-26 collected at 206.6-
-	R35-HQ		4	undulating, open 199.95, 200.03' - Fractures (2), horizontal, rough, stepped, open 200.20' - Fracture, 20 deg, smooth, undulating, open		cavities rare 197.8-199.4' - Same as 196.0-196.9' 199.4-200.2' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine grained, strong HCI reaction, very	207.65'
-	5 ft 100%	42	10	200.5, 200.65' - Fractures (2), horizontal, rough, stepped, open 201.05' - Fracture, <5 deg, rough, stepped, open		weak (R1), voids over 5-10% of surface, trace cavities 200.2-200.8' - yellowish gray, very fine grained, very weak to weak (R1	-
210_ -166.9 -	211.0		>10	201.3' - Fracture, 0 to 90 deg, rough, — undulating, open 201.4, 201.5' - Fractures (2), <5 deg, rough, undulating, open -		- to R2), voids on 1-3% of surface, cavities over 10-15% up to 3/4"-1-3/16" length, abundant hair-line fractures	R35: 9 minutes
-			>10 10	202.2-202.35' - Fractures (2), 50 deg, rough, planar, tight 202.75-203.1' - Fracture zone, 50 to 60 deg, rough, planar, tight		No Recovery 200.8-201.0' Limestone 201.0-202.5' - Same as 200.2-200.8' 202.5-203.0' - light olive gray, (5Y	-
-	R36-HQ 5 ft   46%	14	>10	203.85, 204.55' - Fractures (2), <5 deg, rough, undulating, tight 204.8-205.5' - Fracture zone, 50 to 60 deg, rough, undulating, open		5/2), fine grained, very weak (R1), voids on 1-3% of surface, laminated organics in lower section	-
- 21 <u>5</u> -171.9	<del>4</del> 0%		NR	206.25, 206.6' - Fractures (2), <5 deg, rough, undulating, tight 207.65, 207.85' - Fractures (2), <5 deg, smooth, planar, open, organic material over 30%		- - -	R36: 10 minutes
	216.0			207.94' - Fracture, horizontal, rough, undulating, open			



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 2.0	ft bg	s on 3/	23/07 START: 3/23/2007 END: 3/2	26/200	7 LOGGER : R. McComb	
≥∩≘	_ (9			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
표하는	ID F. F. F. F. F. F. F. F. F. F. F. F. F.	(%) 🛭	28 8	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	] j	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS CORING RATE AND
F.F.	NG CO	OΩ	R F	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
필앙급	SHR	æ	유립	THICKNESS, SURFACE STAINING, AND TIGHTNESS	λ	CHARACTERISTICS	BROIS, TEST RESOLTS, ETC.
				207.98, 208.1' - Fractures (2), horizontal,	Ш	203.0-205.9' - yellowish gray to light	
			4	smooth, planar, organic material over 40% 208.13' - Fracture, 40 deg, smooth, planar,	Ш	<ul> <li>olive yellow, (5Y 7/2 to 5Y 5/2), very fine grained, mild to moderate HCl</li> </ul>	1
-				open	H	reaction, weak (R2), voids over	1
-			>10	208.4-208.55' - Fracture, rock has		40-50% of surface, cavities up to	-
-	R37-HQ			semi-circular fracture pattern, discontinuous, unbroken fracture plane	Ш	1-3/16"-1-9/16" penetrating into core, some recrystallization infilling with	-
-	5 ft	0		208.55' - Fracture, 10 deg, smooth, planar,	Ш	- very fine grained limestone in	1
	37%			tight	$\mathbb{H}$	cavities, trace fossil casts	
			NR	208.80' - Fracture, horizontal 209.05' - Fracture, horizontal, smooth, planar,		No Recovery 205.9-206.0' Limestone	
220			INIX	open	Ш	206.0-207.65' - Same as	1
-176.9				209.20' - Fracture, <5 deg, rough, undulating,	ш	203.0-205.9'	R37: 8 minutes
-				open - 200 85 211 0' Fracture zone numerous	$\Box$	- Limestone 207 65 200 75', vellowish gray (5V	-
-	221.0			209.85-211.0' - Fracture zone, numerous fractures of different orientations	Ш	207.65-209.75' - yellowish gray, (5Y 5/2), very fine grained, very weak	-
-			>10	211.0-212.05' - Fracture zone, numerous	Ш	(R1), voids over 10-15% of surface,	-
1 _			لسا	fractures of different orientations	Ш	trace cavities (up to 3/8"x3/16")	]
				212.75, 212.9' - Fractures (2), 10 deg, rough, planar, tight		ellipsoidal in shape 209.75-212.0' - light olive gray, (5Y	
			>10	212.9-212.15' - Fracture zone, various	Ш	7/2), fine grained, mild HCl reaction,	1
	R38-HQ			orientations	Ш	very weak (R1), voids on 20-30% of	1
-	5 ft	21	>10	216.0-216.2' - Fracture zone, horizontal, rough, planar, open	Ш	surface 212.0-213.3' - very fine grained, mild	1
-	76%			216.55' - Fracture, <5 deg, rough, undulating,	+	to moderate HCl reaction, voids on	-
_			2	open .	Ш	_ 15-20% of surface, 10-15% cavities	-
225				216.75' - Fracture 216.9' - Fracture, horizontal, smooth,	Ш	up to 3/4" to 1-3/16" in length  No Recovery 213.3-216.0'	
-181.9			NR	undulating, open		Limestone	R38: 8 minutes
	226.0			217.05-217.3' - Fracture zone, horizontal,	Н	216.0-216.8' - yellowish gray, (5Y	
1 7				smooth, planar, open 217.3' - Fracture, horizontal, rough, planar,	丗	7/2), moderate HCl reaction, weak (R2), fossiliferous, laminated with	1
1 7			10	open	H	black organic material, voids over	1
-				217.57-217.8' - Fracture zone, rough, planar,	Ш	20% of surface, cavities up to 3/8" on	1
-			>10	various orientations 221.0' - Fracture, horizontal, rough,	+	_ 5% of surface 216.8-216.9' - yellowish gray, (5Y	1
_	D00 110			undulating, open		- 7/2), very fine grained, moderate HCl	-
_	R39-HQ 5 ft	0	>10	221.6-222.05' - Fracture zone, horizontal,	Н	reaction, weak (R2)	_
	56%	-		rough, undulating, open 221.7-222.0' - Fracture zone	Ш	216.9-217.85' - Same as - 216.8-216.9' except color is lighter	
				222.3' - Fracture, horizontal, rough, stepped,	$\vdash$	No Recovery 217.85-221.0'	
230			NR	open		Limestone	1
-186.9			INE	222.5' - Fracture zone, 20 deg, rough, — undulating, open	╂┼┼	<ul> <li>221.0-222.3' - yellowish gray, (5Y 7/2), fine to very fine grained, very</li> </ul>	R39: 10 minutes
-	004.0			222.7-223.6' - Fracture zone	口	weak (R1), rounded to subrounded	-
-	231.0			224.05, 224.3' - Fractures (2), 60 to 70 deg,	╆┩	<ul> <li>rock fragments, voids on 5-10% of</li> </ul>	-
-			>10	rough, undulating, open 224.65' - Fracture, <5 deg, rough, undulating,	口	surface, 3/4"-3/16" cavities on 10% of surface	-
				open - racture, 15 deg, rough, undulating,	버	222.3-223.4' - yellowish gray, (5Y	
			>10	226.4' - Fracture, <5 deg, rough, undulating,	Ш	7/2), very fine grained, mild to	]
				open 226.4-226.65' - Fracture zone, rough,		moderate HCl reaction, very weak (R1)	1
1 7	R40-HQ			undulating, gravel-sized limestone fragments,	Н	223.4-223.5' - Same as 221.0-222.3'	1
-	5 ft 64%	9	>10	open -	Ш	<sup>-</sup> 223.5-224.8' - pale gray, (5Y 6/2),	1
-	64%		1	226.5' - Fracture, horizontal, rough, undulating, open	╀╀	fine grained, mild HCl reaction, very weak (R1), fossiliferous, voids on	1
-				227.05-228.8' - Fracture zone, <5 deg, rough,	Ш	20-25% of surface, cavities (<3/8")	-
235_			NR	stepped, open	$\Box$	over 1-3% of surface	D40: 0 minutes
-191 <u>.</u> 9			' '	231.0-232.0' - Fracture zone, various orientation, gravel-sized rock fragments,	凵	No Recovery 224.8-226.0'	R40: 9 minutes
	236.0			black coating on fragments from 231.0-231.2'	Ш		



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BORING NUMBER:

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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	ft bg	s on 3/	23/07 START: 3/23/2007 END: 3	/26/200	D7 LOGGER : R. McComb	
≥o.⊋	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 240 -196.9	R41-HQ 5 ft 30%	0	>10 >10	232.4-232.8' - Fracture, vertical, rough, undulating, tight 233.0-233.6' - Fracture zone, various orientations 233.7' - Fracture, 0 to 90 deg, smooth, planar, open 234.2' - Fracture, horizontal, rough, undulating, open 236.0-236.75' - Fracture zone, 0 to <5 deg, rough, stepped to undulating, open, distinct fracture planes at 236.12', 236.4', 236.75' 237.0-237.5' - Fracture zone, gravel-sized rock fragments		Limestone  226.0-228.8' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCI reaction, very weak (R1), voids over 5-10% of surface, concentrated to 20-30% of surface in thin (1") beds, trace organics, cavities up to 3/4"-1-3/16" present at 226.0-226.7' No Recovery 228.8-231.0' Limestone  231.0-231.8' - light olive brown, (5Y 5/6), fine grained, very weak (R1), voids over 15-20% of surface Limestone 231.8-233.5' - yellowish gray, (5Y 7/2), very fine grained, very weak	R41: 8 minutes
- - - - 245 -201.9	R42-HQ 5 ft 1 40%	0	>10 >10 NR	planar, open	- 1	(R1), gravel-sized limestone fragments, trace voids 233.5-234.2' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to mild HCl reaction, very weak (R1), trace to 10% voids increasing with depth, some organic staining at 234.1' No Recovery 234.2-236.0' Limestone 236.0-236.75' - yellowish gray, (5Y 7/2), fine grained, no to mild HCl reaction, very weak (R1), sandy	R42: 9 minutes
- - - - 250 -206.9	246.0 R43-HQ 5 ft 46%	0	>10 10 3 NR	247.1' - Fracture, horizontal, smooth, planar, open 247.4' - Fracture, 80 deg, rough, stepped, open 247.6' - Fracture, horizontal, rough, undulating to stepped, open 248.05, 248.25, 248.35' - Fracture (3), horizontal, rough, undulating, open		texture with inclined fracture traces 236.75-237.5' - Same as 233.5-234.2'  No Recovery 237.5-241.0' Limestone 241.0-243.0' - yellowish gray, (5Y 7/2), very fine to fine grained, no to mild HCl reaction, limestone fragments, voids and cavities present on some surfaces  No Recovery 243.0-246.0' Limestone 246.0-248.3' - fine to very fine grained, mild HCl reaction, extremely weak to weak (R0 to R2), voids over 30-40% of surface to 247.8', 0-5% of surface on 247.8-248.3'	R43: 9 minutes
- - - - 255 -211.9	R44-HQ 5 ft 0%	0	NR	-		No Recovery 248.3-251.0' No Recovery 251.0-256.0'	R44: 6 minutes



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723149.9 N, 457976.4 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING	METHOD A	ND EC	JUIPIV	IENT : CME 550X S/N 340253, mud rotary, HQ tools, HW	casıı	ng	ORIENTATION : Vertical
WATER	LEVELS : 2.0	) ft bas	s on 3	/23/07 START : 3/23/2007 END : 3/2	6/200	7 LOGGER : R. McComb	
		, it bgt	5 011 0	DISCONTINUITIES	0,200	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)			<u> </u>	၅	LITIOLOGI	CONNIVILIATO
O'A'S	AN. YANI		ES	DESCRIPTION	C L(	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
필핑은	S. H.	(%) Q	12.0 12.0	DEDTH TYPE OPIENTATION POLICHNESS	딝	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
Ļ ₹¥.	RE SO SO	۵	ACT 7 F	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	MBC	AND ROCK MASS	SMOOTHNESS, CAVING ROD
SUB	SEP	R Q	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
_				256.0-257.0, 261.0-261.5' - Fracture zone,	Н	Limestone	
_			>10			- 256.0-257.0' - yellowish gray, (5Y	_
				fragments		7/2), fine grained, no to mild HCl	
					$\Box$	reaction, extremely weak to very	
_				-		- weak (R0 to R1), poorly fossiliferous,	-
-	DAFILO	ļ		-		some organic staining No Recovery 257.0-261.0'	_
_	R45-HQ 5 ft	0		_		-	_
	20%						
			NR	_	Ш	-	
				-		-	_
260_ -216.9					-		D45: 42 minutes
-210.9				_	ш	_	R45: 13 minutes
	261.0						
-			>10	-	$\vdash$	Limestone	1
-			<u></u>	-		- 261.0-261.5' - Same as 256.0-257.0'	-
_				-		No Recovery 261.5-266.0'	_
					-		
						_	
l -	R46-HQ	)		-		-	-
-	5 ft	0	l	_		_	_
_	10%		NR	<u> </u>		_	
265				<del>-</del>		-	_
-221.9				<del></del>		<del></del>	R46: 9 minutes
-				-	$\perp$	-	-
I _	266.0						
						Bottom of Boring at 266.0 ft bgs on	
_				<del>-</del>		- 3/26/2007	_
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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 wing bit ORIENTATION: Vertical

WATER LEVELS : 1.61 ft bgs on 6/14/07				14/07	START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb
				STANDARD	SOIL DESCRIPTION O COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	AL (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		RECOVI	ERY (ft)	120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
PTH EVA:			#TYPE	6"-6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY  BRILLING 1 Edid Edgs, 7 Ed 13, AND  INSTRUMENTATION
SU				(N)	
42.3	0.0	1.6	SS-1	2-2-3-4 (5)	Poorly Graded Sand With Organics (SP) 0.0-1.0' - light gray, (N6), moist, loose, very fine to fine grained, up to 30% fine organics, trace nonplastic fines, grades to silty sand below Silty Sand (SM)
_	2.0				L \ 1.0-1.6' - grayish brown, (5YR 3/2), moist, loose, fine
- - -		1.0	SS-2	3-6-8-4 (14)	grained, 20% nonplastic fines, fines may be organics  Silty Sand (SM)  2.0-3.0' - Same as 1.0-2.0' except moderate yellowish brown, (10YR 5/4), wet, medium dense, trace roots
-	4.0				Poorly Graded Sand With Silt (SP-SM) Water level is based on Ground Water
5 37.3		2.0	SS-3	1-1-0-1 (1)	4.0-6.0' - pale yellowish brown, (10YR 6/2), wet, very loose, fine grained, 8% low plastic fines, grades to dusky brown (5YR 3/2)  4.0-6.0' - pale yellowish brown, (10YR 6/2), wet, very loose, fine grained, 8% low plastic fines, grades to dusky brown (5YR 3/2)  -
-	6.0				Silty Sand (SM)  Driller's Remark: Spoon fell through entire 2'
- - -		0.4	SS-4	0-0-0-0 (0)	6.0-6.4' - Same as 4.0-6.0' except 10% nonplastic fines
-	8.0				Lean Clay With Sand (CL)
- - 10	10.0	1.4	SS-5	1-2-6-15 (8)	8.0-8.8' - yellowish gray, (5Y 8/1), wet, medium stiff, moderate plasticity, 29% fine to coarse sand and fine to coarse gravel, lens of light bluish gray (5B 7/1), fat clay (CH), no HCl reaction in CH.
32.3 - - -	12:9	1.6	SS-6	12-33-46-50/5" (79)	8.8-9.4' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 5-10% very fine sand, all carbonate  Silt (ML) 10.0-11.6' - grayish orange, (10YR 7/4), wet, hard,
-	12:9				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-	13.4	1.3	SS-7	22-46-50/4" (96/10")	Silft (ML) 12.0-13.3' - Same as 10.0-11.6'
-	14.0				1
15 27.3		1.7	SS-8	29-41-46-50 (87)	Silt (ML) 14.0-15.7' - Same as 12.0-13.3' except trace sand -
-	16.0				Silt With Sand (ML)
-		1.7	SS-9	29-18-14-12 (32)	16.0-17.7' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 10-15% very fine to fine sand-sized, 5% medium to coarse sand, all carbonate.
-	18.0				Silt With Sand (ML)
- - -		2.0	SS-10	21-41-40-19 (81)	18.0-20.0' - Same as 16.0-17.7' except moist
20					
ь	I	L	I		



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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8 wing bit ORIENTATION: Vertical

WATER	LEVELS	: 1.61 ft l	ogs on 6/	14/07	START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	RECOVE	, ,	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH SURFA ELEVAT			#TYPE	6"-6"-6" (N)	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
22.3 - -	20.0	1.9	SS-11	30-37-33-50 (70)	Silt With Sand (ML) 20.0-21.9' - Same as 18.0-20.0' except lenses of coarse sand at 20.7 and 21.7', all carbonate
-		1.7	SS-12	42-48-38-45 (86)	Silt With Sand (ML) 22.0-23.7' - grayish orange, (10YR 7/4), moist, hard, nonplastic, very rapid dilatancy, moderate HCl reaction, 10% to 20% fine to medium sand, carbonate
_	24.0	0.5	SS-13	50/5"	Sandy Silt To Silt With Sand (ML)
25_ 17.3	24.5	0.5	33-13	(50/5")	24.0-24.4' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), moist to wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, up to 25-30% fine to medium sand-sized
-	26.0	1.4	SS-14	43-44-50/3" (94/9")	grains decreasing with depth to 10-15%, all carbonate  Silt With Sand (ML) 26.0-27.3' - dark yellowish orange, (10YR 6/6), moist to wet, hard, nonplastic, moderate HCl reaction, 20-25% fine to coarse sand, trace white carbonate
-	28.0				clay in stringers <1/16" thick
-	26.0	1.8	SS-15	16-30-32-33 (62)	Silt With Sand (ML) 28.0-29.8' - Same as 26.0-27.4' except 20% sand
30	30.0	1.6	SS-16	11-14-28-50 (42)	Silt With Sand (ML) 30.0-31.6' - Same as 28.0-29.8'
_	32.0 32.2		00.4=	<b>50/0</b> 1	
-		0.2	SS-17	50/2" (50/2")	Silt (ML) 32.0-32.1' - dark yellowish orange, (10YR 6/6), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 10-15% fine to medium sand, 5-10% white carbonate clay stringers <1/16" thick
35 7.3	<u>34</u> .9	0.0	\SS-18 <i>)</i>	50/0" (50/0")	Organic Soil (OL) 32.1-32.2' - grayish brown, (5YR 3/2), moist to wet, firm, low to medium plasticity, no to mild HCl reaction, trace white stringers No Recovery 34.0'  Apparent top of rock at 34' End of soil boring on 4/24/07 at 16:30, will continue hole with rock coring 34.0-35.0' interval drilled through to set
-					Begin Rock Coring at 35.0 ft bgs See the next sheet for the rock core log
-					
-					
40					
	L	l .			



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-20
SHEET 3 OF 14

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER LEVELS : 1.61 ft bgs on 6/14/07 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb											
≥∩ ∷	(9)			DISCONTINUITIES	Ĝ	LITHOLOGY	COMMENTS				
ELOV N (ft	Ä, AND ₹Y (%	_	RES T	DESCRIPTION	100	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,				
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.				
7.3	35.0		1	35.4' - Fracture, horizontal, rough, undulating		Limestone - 35.0-39.7' - light olive gray, (5Y 5/2), moderate to strong HCl reaction,	Rock coring begins at 35' below ground surface, continuing after soil boring				
-			1	36.2' - Fracture, 20 deg, rough, undulating, thin (1/16") infill of carbonate derived silt		medium strong (R3), small voids (1/16") over 20% of surface, few cavities up to 3/8", moderately	from surface to 34' Water level at 07:35 hrs on -4/25/07				
-	R1-HQ 5 ft 94%	77	3	37.2' - Mechanical break, horizontal, rough, undulating, open up to 3/4" 37.5' - Fracture, 50 deg, rough, undulating,		fossiliferous - -	-				
-	-		0	black staining on faces, open 1/4-1/2", fossil cast on surface 37.85' - Fracture, 10 deg, rough, undulating,	Ħ	- - -	- R1: 9 minutes				
			0	fossil casts on surface, tight	Ħ	}	-				
40 2.3	40.0		NR	_	卄	No Recovery 39.7-40.0' Silt (ML)	-				
-	R2-HQ 5 ft			NA		-	- 40.0-43.2' - dusky yellow, (5Y 6/4), - wet, high dilatancy, fine sand up to 15%, very weakly indurated - 40.8-41.2'	- - - -			
-	64%		NR		-	- No Recovery 43.2-45.0'	- - R2: 5 minutes				
- 45	45.0				$\  \ $	<u> </u>	-				
45 -2.7	45.0				Ш	Limestone	-				
-			4	break (3), horizontal, rough, undulating, open 1/4" to 1/2"	丗	45.0-49.2' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, extremely weak (R0), trace organics	Layers up to few inches				
-				45.9' - Mechanical break			thick of apparently non indurated material at 48.0-				
			4	46.15' - Mechanical break 46.4' - Fracture, 15 deg, rough, undulating	$\vdash$	- from 48.0-49.0'	48.9'				
	R3-HQ 5 ft	22	3	46.4' - Fracture, 15 deg, rough, undulating, 1/16" of carbonate derived silt infilling	F	[					
_	84%	~~	J	46.6' - Fracture, horizontal, rough, undulating, 1/16" of carbonate derived silt infilling	F	1	]				
-			1	46.7' - Mechanical break 47.2' - Mechanical break	F	}	-				
-			0	47.7' - Mechanical break 47.95' - Mechanical break		No Bosovery 40 2 50 0	R3: 4 minutes				
50	50.0		NR	48.4' - Mechanical break	Ь	_ No Recovery 49.2-50.0'	-				
-7.7	- 2.0		2		Ħ	Limestone 50.0-51.7' - light olive gray, (5Y 5/2),					
-				50.5' - Fracture, 10-70 deg, rough, undulating, multiple fragments up to 1",	口	fine grained, moderate HCl reaction, very weak (R1), trace organics, small	-				
-			0	1/2-3" open 50.95' - Fracture, horizontal, rough,	抻	voids (1/16") over 20% of surface,	-				
-	R4-HQ - 5 ft 34%			undulating, open up to 1"	Ħ	few larger (3/16"x3/8") cavities (molds/casts)	-				
-		22			口	No Recovery 51.7-55.0'	1				
			NR		I	[	]				
] -	]				口	1	] ]				
-					Н	1	R4: 7 minutes				
55_	55.0				卢	1	_				



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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SHEET 4 OF 14

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

ORIENTATION: Vertical

	WATER LEVELS: 1.61 ft bgs on 6/14/07 START: 4/24/2007 END: 5/1/2007 LOGGER: C. Dougherty, R. McComb								
WATER	LEVELS : 1.6	1 ft b	gs on 6		1/200				
≥∩≎	. 0			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	0175 4415 555711 05 0401410		
ᆱ႘뎓	S, E	(%	NA TO			MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND		
F A A	200	(%) O	P. F.	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	JBC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD		
		ď	F.R.A	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ϋ́	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.		
-12.7	034			· · · · · · · · · · · · · · · · · · ·	, o,	Limentone	00.4 11		
-12.7			1	_		Limestone - 55.0-57.7' - Same as 50.0-51.7'	SC-1 collected at 55.0- 55.8' -		
			'	FF OL Machanian Laurali		33.0-37.7 - Same as 30.0-31.7	55.6		
_				55.8' - Mechanical break	╁	57.7-59.4' - moderate yellowish	1		
-			1	56.5' - Mechanical break, for special core	+	<ul> <li>brown, (10YR 5/4), fine grained,</li> </ul>	-		
_					Ш	moderate HCl reaction, very weak to	-		
_	R5-HQ 5 ft	60	3		$oldsymbol{oldsymbol{eta}}$	weak (R1 to R2), small (1/16") voids  over about 30% of surface, few			
	94%	00	3	57.5, 57.7' - Fractures (2), horizontal, rough,		larger (up to 3/16") voids and fossil			
-				undulating, organic material on faces, open	ш	molds	1		
_			3	up to 1/2" 57.7-58.0' - Fracture, vertical, rough,	+	-			
_				undulating, tight		<u>-</u>	1		
			>10	58.3' - Mechanical break			R5: 5 minutes		
60	60.0		NR	58.8-59.5' - Fracture, vertical, rough,	<b>1</b>	Silty Sand (SM)	1		
-17.7	00.0		IVIX	undulating, tight —	1111	59.4-59.7' - moderate yellowish brown, (10YR 5/4), fine grained,	1 -1		
-			3	58.8-59.3 - Fracture, 75 deg, rough, undulating, open to 1/4"		moderate HCl reaction, carbonate	1 -		
_				60.1' - Fracture, horizontal, smooth,	₽	_ \derived	]		
				undulating, open to 1/4"		No Recovery 59.7-60.0'	SC-2 collected at 60.9-		
			1	60.35' - Mechanical break	Ъ.	Limestone	61.95'		
-	R6-HQ			60.9' - Fracture, 45 deg, rough, undulating,	╁	- 60.0-60.5' - Same as 55.0-57.7'	1 1		
_	5 ft	57	1	tight 61.95' - Fracture, 5 deg, smooth, undulating,	仜	except no organics 60.5-62.0' - yellowish gray, (5Y 7/2),	1 -		
	84%			open up to 1/4"	┢	fine grained, moderate HCl reaction,			
				62.4' - Fracture, horizontal, rough, undulating,		very weak to weak (R1 to R2), small			
_			2	carbonate derived silt infill about 0.1" thick	ш	(1/16") voids over up to 15% of	1		
-			>10	63.0, 63.6' - Fractures (2), horizontal, rough, undulating, open up to 1/2"	THE	surface 62.0-62.8' - yellowish gray, (5Y 7/2),	R6: 5 minutes		
_			NR	undulating, open up to 1/2	-11:	fine grained, moderate to strong HCI	-		
	65.0		IVIX			reaction, extremely weak (R0)			
-22.7			4.0	05.0.05.71. 5	Ш	62.8-63.4' - yellowish gray, (5Y 7/2),			
-			>10	65.3-65.7' - Fracture zone, fragments up to 2"	T	fine grained, mild HCl reaction,	1 1		
-				65.7-66.15' - Mechanical break, vertical, rough, undulating, tight		medium strong (R3), small (<1/16")   voids over about 10% of surface	1		
_			3	66.15' - Mechanical break, 15 deg, rough,	╨	- 63.4-63.9' - Same as 62.0-62.8'	1 -		
				undulating, open up to 1/2"		Sand With Silt (SP-SM)			
	R7-HQ			66.5-66.95' - Mechanical break, 25 deg,	$\vdash$	63.9-64.2' - yellowish gray, (5Y 7/2),	SC-3 collected at 68.1-		
	5 ft 90%	58	1	rough, undulating 66.95' - Fracture, smooth, undulating, open	╁┼	fine grained, carbonate derived	69.4'		
-	90 /6			up to 1/2"	仜	No Recovery 64.2-65.0'	1		
-			1	67.4' - Fracture, horizontal, rough, undulating,	$\vdash$	Limestone 65.0-66.9' - pale yellowish brown,	-		
				open up to 1/2"		- (10YR 6/2), fine grained, moderate			
			0	68.1' - Mechanical break		HCl reaction, medium strong (R3),	R7: 8 minutes		
70	70.0		NR	•	1 -	small (<1/16") voids cover about 25%	1		
-27.7	7 0.0			<del>-</del>	匚	of surface, few larger voids or	⊣		
-			0	-	$\vdash$	cavities except in zones from 65.7-65.9' and 66.7-66.9' (about 10%	-		
				_	$\Box$	coverage, voids up to 1/16"	]		
						diameter), moderately fossiliferous,			
			1	·	1-	trace organics	1		
-	R8-HQ			71.9' - Mechanical break	口	66.9-67.4' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction,	1		
-	5 ft	92	1	72.5' Machanical brook harizantal amaath	+	extremely weak (R0), trace organics	-		
	100%			72.5' - Mechanical break, horizontal, smooth, undulating, along bedding plane, tight,		67.4-69.5' - yellowish gray, (5Y 7/2),	]		
				organic material on faces		fine grained, moderate HCl reaction,			
1 7			1	73.2' - Fracture, horizontal, smooth,	1 -	very fossiliferous, voids (fossil	1		
-				undulating, coating of carbonate derived silt		_ molds) up to 3/8" over about 30% of core surface	R8: 7 minutes		
-			1	on faces	╀	No Recovery 69.5-70.0'			
75	75.0								
					1				



PROJECT NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

ORIENTATION: Vertical

WATER	LEVELS: 1.6	1 ft b	gs on 6	5/14/07 START : 4/24/2007 E	END: 5/1/2007	Z LOGGER : C. Dougherty, R. McC	Comb
≥∩≘	_ (6			DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNE PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGH		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-32.7 - - - - - - - - 80_	R9-HQ 5 ft 84% 80.0	48	2 2 1 >10 >10, NR	74.6' - Fracture, horizontal, smooth, undulating, coating of carbonate derived on faces 75.0-75.3' - Fracture zone, multiple fragments, possible mechanical break 75.3-75.5' - Fracture, 70 deg, rough, undulating, possible mechanical break 76.3-76.5' - Fracture zone, multiple fragments 76.9' - Fracture, horizontal, rough, undulatight 77.4-77.8' - Fracture, 65 deg, rough, undulating, coating of carbonate derived 78.2-79.2' - Fracture zone	ating,	Limestone 70.0-72.5' - yellowish gray with some light olive gray mottling, (5Y 7/2 with 5Y 5/2), fine grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), small (<1/16") voids cover about 20% of surface, but not uniformly, few larger (3/16") voids, trace organics 72.5-75.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, very weak (R1), trace organics, voids up to 3/8" x 1-3/16" at 72.6 and 74.0', trace clasts (3/16") of gray limestone.	R9: 8 minutes
-37.7       85	R10-HQ 5 ft 90%	43	>10 >10 1 0 0 NR	80.0-80.7' - Fracture zone, multiple fragments, up to 1-1/2"  81.8-82.7' - Fracture zone (2), multiple fragments, up to 2"  82.9-83.4' - Fracture, vertical, tight		Slightly harder zones from 73.6-74.2' and 74.7-75.0', with small (<1/16") voids covering about 25% of surface 75.0-78.2' - dusky yellow to moderate yellowish brown, (5Y 6/4 to 10YR 5/4), fine grained, weak to very weak (R2 to R1), small (<1/16") voids cover about 35% of core surface, few larger (3/16") voids 78.2-79.2' - light olive gray, (5Y 5/2), moderate HCI reaction, extremely weak (R0), mixed with carbonate derived fine sand and silt No Recovery 79.2-80.0' Limestone	SC-4 collected at 80.7-81.8'
-42.7 	85.0 R11-HQ 5 ft 100% 90.0 R12-HQ 5 ft 62%	70	3 0 1 0 >10 >10 >10 >10 >10 NR	85.5' - Fracture, horizontal, rough, undula coating of carbonate derived silt 85.7' - Fracture, 45 deg, rough, undulatin open up to 1/2" 86.0' - Fracture, horizontal, rough, undulatin open up to 1/2" 87.4' - Mechanical break 87.8' - Mechanical break 89.1-90.0' - Fracture zone, multiple fragments up to 3" 90.3-91.3' - Fracture zone, multiple fragments up to 2", most are 1/2-3/4", so fragments with organic material and coat of brown silt and fine sand 91.75-93.1' - Fracture zone	ating,	80.0-82.8' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), small (<1/16") voids cover about 50% of core surface.  82.8-84.5' - moderate olive brown, (5Y 4/4), moderate HCl reaction, weak (R2), fine grained, small (<1/16") voids cover about 25% of core surface, few larger (3/16") voids, trace organics  No Recovery 84.5-85.0'  Limestone  85.0-90.0' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, medium strong (R3), very fossiliferous, trace organics, small (<1/16) voids cover about 25% of surface, larger (3/8") cavities cover 30% of surface from 85.5 to 86.4 but <5% elsewhere, most larger voids are fossil molds 90.0-93.1' - Same as 85.0-90.0' except weak to medium strong (R2 to R3), moderately fossiliferous, few larger cavities, zone of light olive gray (5Y 7/2) from 91.3-91.75  No Recovery 93.1-95.0'	SC-5 collected at 87.8-89.1' R11: 8 minutes
95 95	95.0					_	N.Z. / Hillinutes



BORING NUMBER: PROJECT NUMBER: 338884.FL A-20 SHEET 6 OF 14

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

	METHOD A	•		IENT : CME 550X S/N 340253, mud rotary, HQ tools, HW	/ casi	ing	ORIENTATION : Vertical
	LEVELS : 1.6			·			
			,	DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-52.7				95-95.9' - Fracture zone		Limestone	
- - - - - - - 100 -57.7	R13-HQ 5 ft 98% 100.0	58	2 0 2 NR	95.9-96.3' - Fracture, vertical, rough, undulating, open up to 1/4" 96.6' - Fracture, horizontal, rough, undulating, multiple fragments 97.5' - Mechanical break 98.1, 98.5' - Fractures (2), 65 deg, rough, undulating, tight 99.1-99.7' - Fracture, 60 deg, rough, undulating, tight 99.2' - Fracture, 60 deg, rough, undulating, tight		95.0-95.5' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, medium strong (R3), includes small (<3/16") clasts of yellowish gray (5Y 7/2) material, small (<1/16") voids cover 10% of surface 95.5-99.5' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), small (1/16"), voids over <5% of surface, concentrated in 1" wide zones, fossil casts and molds moderately abundant, laminated bedding from 97.7-99.5' 99.5-99.9' - light olive gray, (5Y 5/2),	R13: 10 minutes
- - - - - -	R14-HQ 5 ft 94%	53	0 1 1	100.2' - Fracture, horizontal, smooth, undulating, open to 1/2", black staining on surface (70%) 100.7-100.9' - Fracture zone 101.35' - Mechanical break  102.5' - Mechanical break  103.0-104.0' - Fracture, 70 deg, rough, undulating 104.0-104.7' - Fracture, vertical, rough,		fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), laminated bedding , few small (<1/16") voids  No Recovery 99.9-100.0'  Limestone  100.0-100.9' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, very weak (R1), trace organics 100.9-104.7' - light olive gray, (5Y 5/2), fine grained, medium strong (R3), small (1/16") voids over 30% of	SC-6 collected at 101.35- 102.5' -
105	105.0		NR	undulating -	Ħ	surface, larger cavities (3/16" to	1
-62. <del>7</del> -	R15-HC 5 ft 100%	93	1 1 2	105.9' - Mechanical break  106.6' - Fracture, 45 deg, rough, undulating, open up to 1/8"  107.0-107.3' - Fracture zone, multiple fragments, up to 1-1/2"  107.85' - Fracture, 45 deg, rough, undulating, open up to 1/8"			 - - - - -
	110.0		0	108.15' - Fracture, 20 deg, rough, undulating, tight 108.6' - Fracture, 40 deg, rough, undulating, tight			SC-7 collected at 108.85- 110.0' - R15: 8 minutes
-67.7 - - -			0	- - -		110.0-114.8' - Same as 100.9-104.7' except fewer fossils and fewer cavities larger than 3/16"	SC-8 collected at 113.65- 114.5' - -
-	R16-HC 5 ft 96%	82	2	111.8-112.1' - Fracture, 45 deg, rough, undulating, dark staining on 5% of surface, open <1/8"  112.1-112.6' - Fracture, 65 deg, open up to 1/4"		  -  -  -	- - R16: 8 minutes
- 115	115.0		0	112.5-112.7' - Fracture, 45 deg, tight 113.25-113.45' - Fracture, 55 deg, tight 113.65, 114.5' - Mechanical break (2)		- -	- -
110	110.0				T		



PROJECT NUMBER:

33884.FL

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

ORIENTATION: Vertical

WATER	LEVELS : 1.6	1 ft b	gs on (	6/14/07 START : 4/24/2007 END : 5/	1/200	7 LOGGER : C. Dougherty, R. McCe	omb
≥∩ ∵	- (9			DISCONTINUITIES	ڻِ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIO	E RU	(%) <sub>Q</sub>	F.0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV EV	SORE	ğ	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥMΕ	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-72.7	0716	Ľ	NR/		1111	\No Recovery 114.8-115.0'	
'-"-			NA	115.5-116.3' - Fracture zone		Silty Sand (SM)	-
-			0	110.5-110.5 - 11dctate 2016	F	L \ 115.0-115.5' - light olive gray, (5Y \ 5/2), fine grained, strong HCl	-
-			1	116.25-116.5' - Fracture, 65 deg, rough,	Ħ	reaction, carbonate derived	-
-	R17-HQ			undulating, open	L	Limestone 115.5-118.2' - yellowish gray, (5Y	-
-	5 ft	37	1	117.5' - Mechanical break	₩	7/2), moderate HCl reaction, medium	-
-	78%			117.7' - Mechanical break		<ul> <li>strong (R3), fine grained, moderately</li> <li>∫ fossiliferous, (casts and molds),</li> </ul>	-
-			NA	-	-	「 small (<1/16") voids cover about 20%	-
_				-	1111	\ \document{\lange} \ \of core surface, several large \ \((3/8\)"x3/4\") voids below 117.5\'	R17: 7 minutes
120	100.0		NR	-	-	Silty Sand (SM)	-
120 <u> </u>	120.0			<del>-</del>	1.11	118.2-118.9' - Same as 115.0-115.5' /- <b>No Recovery 118.9-120.0'</b>	
-			1		╁	Limestone	-
-				120.8' - Fracture, horizontal, rough, undulating, open up to 1/2"	╁	<ul> <li>120.0-124.6' - light olive gray, (5Y 5/2), fine grained, moderate HCl</li> </ul>	-
_			0	3, 17 - 17 -	F	reaction, weak (R2), moderately	1
-	R18-HQ				H	<ul> <li>fossiliferous, particularly from 120.0-121.0, small (1/16") voids over</li> </ul>	-
	5 ft 96%	85	2	122.4' - Mechanical break 122.65' - Fracture, horizontal, smooth, planar,	Ħ	25% of surface, larger (3/8"x3/4") voids (fossil molds) 5-10% of surface	
			1	open up to 1/4", coating of carbonate derived	H	from 120.0-121.0'	SC-9 collected at 122.8- 123.9'
_			·	sandy silt 122.8' - Fracture, 45 deg, rough, undulating, .	Ľ	_	-
_			1	open up to 1/8", coating of carbonate derived sandy silt	$\vdash$	_	
125 -82.7	125.0		NR	123.9' - Fracture, 30 deg, rough, undulating, _	₽	124.6-124.8' - Same as 120.0-124.6' except medium strong (R3), 3/16"	_
-02.7			2	open up to 1/2" 124.2' - Fracture, horizontal, rough,	$\vdash$	<ul> <li>fossil molds/casts on 5% of surface,</li> </ul>	-
-				undulating, open up to 1/4" 125.1-125.4, 125.2-125.4' - Fractures (2), 60	$\vdash$	small (<1/16") voids on 10% of surface	-
_			3	deg, rough, undulating, tight	口	No Recovery 124.8-125.0' Limestone	-
-	R19-HQ			126.45, 126.6' - Fractures (2), horizontal, smooth, undulating, coating of carbonate	仜	<sup>-</sup> 125.0-129.3' - light olive gray, (5Y	-
-	5 ft 86%	68	1	derived silt on faces, open up to 1/8"		<ul> <li>5/2), moderate HCl reaction, medium strong to strong (R3 to R4),</li> </ul>	-
-	0070			126.9' - Mechanical break 127.7' - Fracture, horizontal, smooth,	Ь	laminated bedding with areas of few	SC10 collected at 127.7-
-			2	undulating, coating of carbonate derived silt on faces	H	<ul> <li>small voids and light gray (N7) color to 126.5, zone of larger (3/8") cavities</li> </ul>	128.6' -
_			0	128.6' - Fracture, 45 deg, rough, undulating,	F	from 127.4-127.8	R19: 7 minutes
130	130.0		NR	open up to 1/8" 128.7' - Fracture, horizontal, smooth,	H	- No Recovery 129.3-130.0'	1
-87.7			2	undulating, open up to 1/4"	]_	Limestone	
			2	130.4' - Mechanical break	H	- 130.0-133.0' - Same as 124.6-124.8' except very fossiliferous below 131.0'	
			1	131.0' - Fracture, horizontal, rough, undulating, open to 1/4"	H	_	]
_				131.65' - Fracture or mechanical break, 35	片		_
_	R20-HQ 5 ft	40	>10	deg, rough, undulating 131.8-132.8' - Fracture zone, multiple	F	_	_
_	94%	-		fragments	$oxed{\square}$	133 0 134 3! light alive array (5V	_
_			3	131.1, 133.6' - Fractures (2), horizontal, smooth, planar, coating of carbonate derived	Ħ	133.0-134.2' - light olive gray, (5Y - 5/2), moderate HCl reaction, very	_
-				silt, open to 1/4"	口	weak (R1), small (1/16" voids) over 50% surface, larger (up to 3/8") over	R20: 7 minutes
			4	133.9' - Fracture, 15 deg, rough, undulating, coating of silt, open	口	- <5% of surface	-
135	135.0		NR		╆		



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33884.FL

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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

				1ENT : ONE 330X 3/14 340233, Hud Totally, Fig 10013, FIV		· <del>9</del>	ONLINIATION: Vertical
WATER	LEVELS: 1.6	1 ft b	gs on (	6/14/07 START : 4/24/2007 END : 5/	1/2007	LOGGER : C. Dougherty, R. McC	Comb
	_			DISCONTINUITIES	(n	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	DOOK TVPE COLOR	1
D A N	ŽĄΣ	_	FRACTURES PER FOOT	DESCRIPTION	□	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
A A G B	SET N	(%) Q		DEPTH, TYPE, ORIENTATION, ROUGHNESS,	点	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
두뚜장	888	ØΒ	AC RF	PLANARITY, INFILLING MATERIAL AND	₩	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SE	8필분	R O	FR	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-92.7				134.2, 134.5, 134.6' - Fractures (3), smooth,	Н	Limestone	<del> </del>
			4	planar, along bedding planes, coating of silt		- 134.2-134.7' - yellowish gray and	_
				135.2, 135.4, 135.6, 138.8' - Fractures (4),	ш	light olive gray, (5Y 7/2 and 5Y 5/2),	
-				horizontal, smooth, planar, no stains, open	Н	fine grained, mild to moderate HCI	1
-			>10	1/8-1/4"	╂┼┤	<ul> <li>reaction, thinly laminated bedding.</li> </ul>	I -
				136.1-137.0' - Fracture zone, horizontal,		Yellowish gray areas are very weak	
	R21-HQ			smooth to rough, open up to 1/4"		rock (R1) with small (<1/16") voids	
-	5 ft	40	0	137.0, 137.4, 138.45' - Mechanical break (3)	ш	over 30% of area. Olive gray areas	1 1
_	98%				+	have no small voids, medium strong	1
			,			rock (R3). Cavities up to 3/8"x1-3/16" are along bedding	SC-11 collected at 137.4-
I -			1	100 7 100 01 5 1 00 1	Ш	planes.	138.45'
-				138.7-139.2' - Fracture, 60 deg, rough,	╁┼	No Recovery 134.7-135.0'	D24: 0 minutes
			1 1	undulating, tight	Н	Limestone	R21: 8 minutes
140	140.0			139.3' - Fracture, horizontal, rough, undulating, coating of carbonate-derived silt,	Ш	135.0-139.2' - Same as 133.0-134.2'	1
-97.7	1-70.0		NR	open up to 1/2"	П	T except with thinly laminated bedding	1 →
-			0	5 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	$\mu \mu \mu$	from 135.0-136.1' and predominantly	45, 5
					Ш	the stronger light olive gray rock	Driller's Remark: Loss of
I -				,	1⊣1	139.2-139.9' - light olive gray, (5Y	circulation at 141'
-			>10	141.3-142.7' - Fracture zone, fragments up to	11	5/2), fine grained, moderate HCI	1 -
				2"		reaction, very weak (R1), small	
	R22-HQ				Ш	(<1/16") voids over about 25%	
-	5 ft	25	>10		++	urface larger (3/16") voids over 5% of surface	1
l _	80%				Ш	No Recovery 139.9-140.0'	_
						- Silt (ML)	
_			>10		ш	140.0-140.5' - light olive gray, (5Y	1
_					Н	5/2), carbonate derived	Dan O minutes
l _			NR			- Limestone	R22: 9 minutes
145	145.0		INIX			140.5-141.1' - yellowish gray and	
-102.7	140.0			<del>-</del>	╁┼	medium light gray, (5Y 7/2 and N6),	_
_			3		╀┤	- fine grained, strong HCl reaction,	
						medium strong to strong (R3 to R4),	
				146.0' - Fracture, horizontal, rough,	Ш	very fossiliferous.	1
-			3	undulating	╀┼┼	- 141.1-144.0' - yellowish gray, (5Y	1 -
I _				146.1' - Fracture, 10 deg, rough, planar,	$\vdash$	7/2), fine grained, strong HCI	]
	R23-HQ		,	black staining on surface		reaction, weak (R2), very	SC-12 collected at 147.1-
I -	5 ft	42	1	146.15' - Fracture, 65 deg, rough, undulating,	Ш	- fossiliferous	148.2'
I -	64%		$\vdash$	dark staining on surface 146.5, 146.63' - Fractures (2), smooth,	╂┼┤	No Recovery 144.0-145.0' Limestone	-
				146.5, 146.63° - Fractures (2), smooth, planar, dark staining on surface	Н	_ 145.0-146.0' - yellowish gray, (5Y	
I -				147.05' - Fracture, horizontal, rough,		7/2), strong HCl reaction, weak to	1
-			NR	undulating, possible mechanical break	igspace	medium strong (R2 to R3), few small	R23: 6 minutes
I -					₽₩	(1/16") voids, poorly fossiliferous	0. 0/0.00
150	150.0				Н	146.0-147.05' - yellowish gray, (5Y	
-107.7				_	Ш	7/2), moderate HCl reaction, weak to	
-			2	150.35' - Fracture, horizontal, rough, planar,	Ш	_ medium strong (R2 to R3),	]
				open up to 1/4"	Н	moderately fossiliferous, small	
				150.85' - Fracture, 15 deg, rough, planar,	Н	(<1/16") voids cover about 10% of	1
-			2	tight	ш	core, few larger (3/16") voids, laminated bedding at about 146.5'	-
l -				151.3-152.1' - Fracture, 60-40 deg, rough,	$\Box$	147.05-148.2' - light olive gray, (5Y	1 -
	R24-HQ		,	undulating, open up to 1/8"	$\vdash \vdash$	_ 5/2), fine grained, moderate HCl	I
I -	5 ft	70	1	151.6' - Fracture, horizontal, rough,	1 + 1	reaction, small (1/16") voids over	1 1
-	94%		<u> </u>	undulating, open up to 1/8" 152.95' - Fracture, 45 deg, rough, undulating,		- 40% of surface	1 -
			0	tight	Щ	No Recovery 148.2-150.0'	I
I -			'	ugiit	$\vdash\vdash\vdash$	Limestone	1
-				154.0-154.7' - Fracture zone, multiple	╂┼╂	150.0-151.8' - Same as	R24: 8 minutes
-			>10	fragments up to 1-1/2"	Ш	_ 147.05-148.2' except gradual contact	-
155	155.0		NR	<b>♥</b>	Ы	at bottom	<u>                                     </u>
L							ī

ORIENTATION : Vertical



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338884.FL

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 1.6	1 ft b	gs on (	6/14/07 START : 4/24/2007 END : 5/	1/200	7 LOGGER : C. Dougherty, R. McC	comb
300	()			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		SII.	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OUTE AND DEDTH OF GARNING
품워E	RUN H, A	(%) 🛚	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	<b>1</b> 일	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F A A	RE NGT CO	Ø	ACT R F(	PLANARITY, INFILLING MATERIAL AND	MB(	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
BS급	SHR	S.	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥ	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-112.7			_	155.1, 155.4, 155.5, 155.6' - Fractures (4),	ш	Limestone	
_			5	smooth, planar, staining present on faces at	Ш	<ul> <li>151.8-154.0' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction,</li> </ul>	SC-13 collected at 155.6-
-				155.4' and 155.5' 155.2-155.45' - Fracture, 45 deg, rough,	╁┼	medium strong to strong (R3 to R4),	156.5'
-			2	undulating	Ħ	fossiliferous (casts and molds), small	-
-	R25-HQ			156.65, 156.7' - Fractures (2), horizontal, smooth, undulating, open up to 1/2"	╂	(<1/16") voids cover 15% of surface, few clasts (<3/16") of lighter colored	-
-	5 ft	58	1	Smooth, undulating, open up to 1/2	$\blacksquare$	<ul> <li>material, laminated bedding from</li> </ul>	-
_	92%			157.9-158.1' - Fracture, 45 deg, rough,	-Ш	153.5 -154.0 154.0-154.7' - light olive gray, (5Y	-
_			>10	undulating, dark staining on faces (50% of	+	<ul> <li>5/2), moderate HCl reaction, weak</li> </ul>	-
_				area) 158.3-158.9' - Fracture zone, most fractures	H	(R2), small (1/16") voids over 20% of	
_			1	appear to be horizontal	┵	surface - <b>No Recovery 154.7-155.0'</b>	R25: 7 minutes
160	160.0		NR	159.5' - Fracture, horizontal, smooth, planar		Limestone	End of drilling for 4/25/07,
-117.7			1	160.0-160.3' - Fracture zone, multiple fragments up to 1-1/2"	Ш	155.0-155.5' - Same as 154.0-154.7' except with irregular uneven thinly	160' at 15:45.  Resume coring at about _
1				magnificities up to 1-1/2	H	laminated bedding	07:35, 4/26/07
_				161.1' - Fracture, horizontal, smooth, planar,	H	155.5-158.0' - light olive gray, (5Y 5/2), moderate HCl reaction, medium	Core barrel was clogged.
_			2	open up to 1/8"		strong (R3), poorly fossiliferous,	Barrel was cleared and run - completed.
_	R26-HQ		1	161.4' - Fracture, horizontal, open up to 1" 162.0' - Mechanical break	Ш	gradual contact below, few small (<1/16") voids	Rock fragments at top of
_	5 ft 42%	27		•	ш	158.0-158.9' - moderate olive brown,	run are probably pieces - from first attempt; bit
-	7270				$\dagger \Box$	(5Y 4/4), fine grained, mild HCl	marks in 2 directions are
_			NR		H	reaction, weak (R2), small (<1/16") voids cover about 50% of surface	on some fragments –
-					世	158.9-159.6' - vellowish grav. (5Y	End of R26-HQ fits together with start of R27-
-					₩	<ul> <li>7/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4),</li> </ul>	HQ -
165_ -122.7	165.0			_	-Ш	few small (<1/16") voids, group of	R26: 4 minutes
			2	165.2' - Fracture, 15 deg, rough, undulating,	Ш	healed vertical fractures from 158.9-159.3'	-
_				open to up to 1/4" 165.5' - Fracture, horizontal, rough,	+	No Recovery 159.6-160.0'	-
_			4	undulating, open up to 1/2"		Limestone	_
_				166.1' - Fracture, horizontal, rough, undulating, open up to 1/2"	Ш	160.0-161.5' - moderate yellowish - brown, (5Y 4/4), fine grained, mild	_
_	R27-HQ 5 ft	38	2	166.55-167.2' - Fracture zone, horizontal,	$oldsymbol{\perp}$	HCl reaction, medium strong (R3),	_
1 _	84%	50		smooth, planar, spaced at about 0.05' 167.7' - Fracture, horizontal, smooth to planar	Щ	small (<1/16") voids cover about 25% of core surface, thin (1/2") zones	]
1			3	on one side, rough to undulating on the other,	Ы	have no small voids	]
1 -				open to about 3/4"		161.5-162.1' - moderate yellowish - brown, (10YR 5/4), fine grained, mild	R27: 6 minutes
1 -				168.3' - Fracture, horizontal, rough, undulating, dark staining on 40% of surface,		HCl reaction, strong (R4), small	]
170	170.0		NR	open to 1/4"	Н	(<1/16") voids, few fossil molds and	End of core at 169.2' fits
-127.7				168.3-168.7' - Fracture, 75 deg, rough, — undulating, open <1/4"	Ш	— casts No Recovery 162.1-165.0'	together with start of core — at 170.0'
1 -			0	168.9' - Mechanical break	Ш	Limestone	-
1 -					+	<ul> <li>165.0-168.0' - Same as 161.5-162.1'</li> <li>except except larger voids and fossil</li> </ul>	
1 -			0			molds/casts (3/16") over 5% of area	-
-	R28-HQ			172 1' Fracture horizontal rough	世	<ul> <li>from 165.0-166.3', laminated bedding at 166.0-167.5'</li> </ul>	SC-14 collected at 172.0-
-	5 ft	85	2	172.1' - Fracture, horizontal, rough, undulating on one face, smooth to planar on	₩	168.0-169.2' - light olive gray, (5Y	172.85'
-	100%			the other, open up to 1/2"	口	_ 5/2), moderate HCl reaction, weak	-
-			3	172.95' - Fracture, horizontal, rough, undulating, coating of carbonate derived silt	+	(R2), small (1/16") voids over 15% of surface, clasts of light gray (N7),	-
-				on one face, open up to 1/2"	H	limestone up to 3/16"x1-3/16" cover	D20: 6 minutos
1 -			3	173.15-173.3' - Fracture, 45 deg, rough, undulating, tight	H	<5% of surface, clasts are oriented horizontally	R28: 6 minutes
175	175.0			and ald the grit	Ш	No Recovery 169.2-170.0'	
1							



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 1.6	1 ft bo	gs on 6	6/14/07 START: 4/24/2007 END: 5/	1/200	LOGGER : C. Dougherty, R. McC	Comb
≥∩≘	- (°			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A B B B B B B B B B B B B B B B B B B B	S.F.R	D (%)	TUR 00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FF 등	S S S S S S S S S S S S S S S S S S S	αD	AC.	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	225	2	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	2.16. 6, 120. 112.02.16, 2.16.
-132.7			5	173.7, 173.9' - Fractures (2), horizontal,	Ш	Limestone	
			5	smooth, planar, open up to 1/4" 174.0, 174.4, 174.5' - Fractures (3),	Ш	- 170.0-172.0' - Same as 168.0-169.2' except moderately fossiliferous	1
1 1				horizontal, rough, undulating, coating of silt	$\mathbb{H}$	(molds and casts), gray clasts now	1 1
1 -			1	infill at 174.0', open up to 1/2" 175.2, 175.3, 175.35, 175.6, 175.7' -	Ħ	<ul> <li>5% of core, area of 3/16" to 3/8"</li> <li>voids from 171.0-171.6</li> </ul>	1 1
1 -	R29-HQ			Fractures (5), horizontal, rough, planar, open	╁┼	172.0-173.7' - yellowish gray, (5Y	1 -
-	5 ft	23	>10	1/8" to 1/4"	Ш	<ul> <li>7/2), fine grained, moderate HCl</li> </ul>	
_	72%			175.7-176.2' - Fractures (2), 70 deg, rough, undulating, tight	$+ \Box$	reaction, medium strong (R3), small (1/16") voids over 15% of surface	1 -
			2	177.2' - Fracture, horizontal, rough,		- 173.7-175.0' - moderate yellowish	-
				undulating, tight		brown, (10YR 5/4), fine grained,	]
			NR	177.4-178.2' - Fracture zone 178.3' - Fracture, smooth, undulating, open		moderate HCl reaction, weak (R2), small (<1/16") voids cover about 20%	R29: 4 minutes
180	180.0			up to 1/8"		of core surface	1
-137.7	. 50.0			178.4' - Fracture, 45 deg, rough, undulating, —	111	↑ 175.0-178.0' - Same as 173.7-175.0'	1 -1
			2	open <1/8" 180.0-180.6' - soil and rock fragments		except with larger (3/8"x3/8") cavities from 175.7-177.4' and fewer small	1 1
-				180.1,180.95' - Fractures (2), horizontal,	$+ \Box$	(1/16") voids below 176.0'	1 -
-			>10	smooth, planar, coating of carbonate derived	$\blacksquare$	178.0-178.6' - yellowish gray and	1 -
-				silt, open up to 1/8" 181.1-181.7' - Fracture zone	₽	light olive gray, (5Y 7/2 and 5Y 5/2), fine grained, mild HCl reaction,	1 -
	R30-HQ 5 ft	13	3	182.0' - Fracture, 20 deg, rough, undulating,	Щ	medium strong to strong (R3 to R4),	
	90%			open up to 1/8"		thinly laminated bedding with few	
				182.3' - Fracture, horizontal, rough, undulating, coating of carbonate derived silt,	$\vdash$	small (1/16") voids (bedding about	1
			4	open to 1/4"	Ш	No Recovery 178.6-180.0'	1 1
1 1			1	182.7' - Fracture, horizontal, rough,	₩	Silty Sand (SM)	R30: 9 minutes
<sub></sub>			NR	undulating, rock fragments up to 1", open 183.0, 183.2, 183.4, 183.5' - Fractures (4),	世	180.0-180.4' - moderate olive brown, (5Y 4/4), fine grained, mild HCl	1 -
185_ -142.7	185.0		INIX	horizontal, rough, undulating, open from 1/4 -	+	reaction, carbonate derived	l
			1	to 1/2"	H	- Limestone	1
1 4				184.3' - Fracture, horizontal, smooth, undulating, open up to 3/8"	₽₩	180.4-181.1' - yellowish gray, (5Y	SC-15 collected at 185.6- 186.35'
			7	185.5' - Fracture, 30 deg, rough, undulating,	Ш	7/2), fine grained, mild HCl reaction, medium strong (R3), thinly laminated	160.33
			,	dark staining on 40% of surface, tight 186.4-187.0' - Fractures (6), horizontal,	Н	bedding , few small (<1/16") voids	
	R31-HQ			smooth, planar, except at 186.4' which is	Н	181.1-183.5' - yellowish gray, (5Y - 7/2), fine grained, mild HCl reaction,	1
	5 ft 100%	52	4	rough and undulating, all are open up to	Ш	very weak to strong (R1 to R4), few	1
1 1	.0070			about 1/4" 186.8-187.0' - Fracture, vertical, rough,	ш	small (<1/16") voids, few fossil	1
			3	undulating, tight	$\Box$	_ molds/casts (3/16"), large (3/8"x1-3/16") void at 183'	1
				187.1' - Fracture, horizontal, smooth, planar,	+	183.5-184.5' - yellowish brown,	R31: 10 minutes -
			3	open up to 1/4" 187.4, 187.5, 187.6' - Fractures (3),	$\Box$	(10YR 5/4), fine grained, mild HCl	-
	190.0			horizontal, rough, undulating, open up to 1/2" -	╀┤	reaction, weak to medium strong (R2 to R3), small (<1/16") voids cover	_
-147.7			3	188.0' - Fracture, 15 deg, rough, undulating,	Щ	about 25% of surface, larger (3/16")	]
				coating of carbonate derived silt, dark staining on 50% of surface, open to 1"	Н	voids and fossil molds are about 5%,	
]			4	188.2' - Fracture, horizontal, rough,		moderately fossiliferous No Recovery 184.5-185.0'	1
			1	undulating, open up to 1/2"	╁┤	Limestone	1
	R32-HQ			188.8' - Fracture, horizontal, smooth, undulating, open up to 1/2"	Ш	185.0-186.6' - Same as 183.5-184.5'	1
	5 ft	65	1	188.8-189.0' - Fracture, vertical, rough,	$\Box$	_ except few fossil casts/molds, few larger voids.	-
<b>I</b> ⊢	90%			undulating, tight	+	186.6-187.5' - yellowish gray, (5Y	-
			3	189.7' - Fracture, horizontal, rough, undulating, dark staining on 70% of surface	$\Box$	7/2), fine grained, mild HCl reaction,	-
				189.9' - Fracture, 55 deg, smooth, undulating	₽₩	strong (R4), laminated bedding - (1/2"-1" thick), small (<1/16") voids	Dog o minutes
			1	190.2' - Fracture, horizontal, smooth, undulating, open up to 1/8"		present in alternating bedding	R32: 9 minutes
195	195.0		NR	undulating, open up to 1/6	ЬН	laminations	



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 1.6	1 ft bo	gs on (	5/14/07 START : 4/24/2007 END : 5/	1/200	7 LOGGER : C. Dougherty, R. McC	Comb
≥ ∩ ⊕	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THE CONTROL OF THE PROPERTY OF THE PROPERT	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-152.7	S H E	Δ.	1	THICKNESS, SURFACE STAINING, AND TIGHTNESS  190.6' - Fracture, 5 deg, rough, planar, open up to 1/4"	S	CHARACTERISTICS  Limestone - 187.5-188.7' - yellowish gray, (5Y	_
- - - - -	R33-HQ 5 ft i 94%	23	2 >10 >10	190.9' - Fracture, horizontal, rough, undulating, fragments, open up to 1" 191.1-191.3' - Fracture, 45 deg, rough, undulating, tight 192.1' - Fracture, horizontal, rough, undulating, open up to 1/4" 193.3' - Fracture, horizontal, rough, undulating, tight 193.7, 193.8' - Fractures (2), horizontal, rough, undulating, open up to 3/4" 195.0-195.5' - rock fragments with rough and undulating surfaces		7/2), fine grained, mild to moderate HCl reaction, strong (R4), very fossiliferous, small (<1/16") voids cover about 25% of surface, larger (> 3/8") voids and fossil molds/casts cover about 5% of surface 188.7-190.0' - Same as 185.0-186.6' except with zone of small (<1/16") voids 10% and fossil molds from 189.0-189.3', laminated bedding at top and bottom of interval 190.0-190.5' - light olive gray, (5Y	SC-16 collected at 195.5- 196.8' - - - - - R33: 7 minutes - End of drilling, 200',
200 -157.7 - - -	200.0		6 >10	196.8' - Fracture, 45 deg, rough, undulating, tight 169.9-197.3' - Fracture, 70 deg, rough, undulating, open up to 1/2" 197.4-197.8' - Fracture, 60 deg, rough, undulating, open up to 1/8" 197.8-198.5' - Fracture zone, multiple fragments up to 3" long		5/2), fine grained, mild HCl reaction, strong (R4), laminated bedding (1/4" to 3/4" thick beds), small (<1/16") voids present in alternating beds, 10% overall coverage 190.5-191.0' - moderate olive brown, (5Y 4/4), fine grained, mild to moderate HCl reaction, medium	4/25/07 at 10:57  Resume drilling 5/1/07  R. McComb is the logging person from 200' to the end of borehole
- - -	R34-HQ 5 ft 100%	48	0	200.1' - Fracture, <5 deg, rough, undulating, loose 200.2' - Fracture, <5 deg, rough, stepped, loose 200.55, 200.82' - Fractures (2), horizontal, rough, undulating, loose 200.9, 200.95' - Fractures (2), horizontal,		strong (R3), very fossiliferous, fragments (up to 1.5") of light olive grey (5Y 5/2) limestone, cavities up to 1.5" diameter occupy about 25% of core surface. 191.0-194.5' - dusky yellow to light olive, (5Y 6/4 to 5Y 5/2), fine grained,	SC-17 collected at 202.95- 204.05' - R34: 9 minutes
205 <u>-</u> -162.7	205.0		1	smooth, stepped, loose 200.95-201.85' - Fracture zone, horizontal, rough, stepped to undulating, loose	Ħ	mild HCl reaction, weak to medium strong (R2 to R3), with dusky yellow areas being weaker, crenelated	
-	R35-HQ		3	202.25' - Fracture, 20 deg, rough, stepped, loose - 202.35' - Fracture, 40 deg, rough, stepped to undulating, loose 202.8' - Fracture, horizontal, rough, stepped to undulating, loose		bedding lamination grading into more uniform laminated bedding by 194.0', small (<1/16") voids about 10% coverage, trace organics, large (3/8"x1-3/16") cavity at about 192.0'  No Recovery 194.5-195.0'	- - -
-	5 ft 97%	52	0	202.95' - Fracture, horizontal, smooth, planar, loose 204.05' - Fracture, 40 deg, rough, stepped, tight		Limestone  195.0-198.0' - yellowish gray, (5YR 7/2), moderate HCl reaction, weak to medium strong (R2 to R3), very	SC-18 collected at 207.55- 209.04'
210 167.7	210.0		3 NR	205.4' - Fracture, <5 deg, rough, stepped, loose 206.2' - Fracture, 0-90 deg, rough, stepped, tight —		fossiliferous, small voids (1/16") over 30% of surface, larger (3/16") cavities over < 5% of surface (molds/casts)	R35: 6 minutes
-167.7 - - - -	Dog Ho		>10	206.8, 206.9' - Fractures (2), 40 deg, rough, stepped, loose 207.7' - Fracture, 70 deg, rough, stepped, loose 209.01' - Fracture, horizontal, smooth, planar, loose		198.0-199.7' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), laminated bedding 198.0-198.8, few fossil molds/casts, small (<1/16") voids	- - -
-	R36-HQ 5 ft 80%	0	>10	209.1, 209.27' - Fracture (2), <5 deg, smooth, undulating, loose 210.1' - Fractures (2), horizontal, smooth, planar, loose		about 10% coverage No Recovery 199.7-200.0'	-
245	215.0		>10 NR	210.3' - Fracture, 60 deg, smooth, stepped, loose 210.5, 210.6' - Fractures (2), horizontal, smooth, planar, loose		- - -	R36: 5 minutes
215	Z 13.U						



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 1.6	31 ft bo	gs on 6	S/14/07 START: 4/24/2007 END: 5	/1/200	7 LOGGER : C. Dougherty, R. McC	Comb
≥0 <i>≎</i>	(%)			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	CORI	RQ	FRAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-172.7 -			3	210.9' - Fracture, <5 deg, rough, stepped, loose	H	Limestone - 200.0-205.0' - yellowish gray, (5Y	_
_				210.9-211.5' - Fracture zone, various orientations, rock fragments	世	7/2), very fine grained, weak to medium strong (R2 to R3), cavities	-
-			2-10	211.5' - Fracture, 20 deg, rough, stepped,	╀	<ul> <li>up to 1/16" over to 40% of surface</li> </ul>	-
-	R37-HQ			loose 212.0, 212.1' - Fractures (2), 40 deg, rough,	$\blacksquare$	(more common 204.0-205.0) with zone of cavities interbedded with	-
-	5 ft		3-10	undulating, loose	田	<ul> <li>zones of few cavities. Cavities</li> </ul>	SC-19 collected at 217.45-
-	98%			212.25, 212.55' - Fractures (2), <5 deg, rough, undulating, loose	口	typically 1/16"x1/16" (casts/molds), largest is 2"x1/2" at 203.55	218.25' -
_			>10	212.8-213.1' - Fracture zone, 40-0 deg, rough, loose	世	<ul> <li>Limestone</li> <li>205.0-206.0' - yellowish gray to light</li> </ul>	-
-			. 40	213.3, 213.45' - Fractures (2), <5 deg, rough,	ш	olive gray, (5Y 7/2 to 5Y 5/2), fine to	R37: 6 minutes
220	220.0		>10	stepped, loose 213.75, 213.85' - Fractures (2), horizontal		<ul> <li>very fine grained, weak (R2), with angular medium strong (R3)</li> </ul>	-
-177.7			NR)	and vertical, rough, stepped, loose 214.0' - Fracture, horizontal, rough,	Н	limestone fragments (brecciated), cavities cover 50% in fine grained	
_			>10	undulating, loose	Н	material, about 3-5% in fine grained	_
			3	215.1' - Fracture, horizontal, smooth, undulating, loose	F	angular limestone rock fragments 206-208.7' - light olive gray, (5Y 5/2),	
_				215.6, 215.75' - Fractures (2), <5 deg, rough,	耳	fine to very fine grained, mild HCI	_
_	R38-HQ 5 ft	14	>10	stepped, loose 216.2' - Fracture, <5 deg, rough, undulating,	H	reaction, very weak (R1), cavities of 1/16" to 1/32" covering 40-50% of	_
_	66%		0	loose 216.65' - Fracture, 40 deg, rough, undulating,	廿	surface, trace fossil casts/molds  208.7-209.85' - yellowish gray, (5Y	=
_				loose	出	_ 7/2), very fine grained, moderate HCl	-
-			NR	216.85-217.1' - Fracture zone, 0-90 deg, rough, undulating to stepped, loose	₩	reaction, very weak (R1), voids/cavities up to 3/8"x3/8"	R38: 5 minutes
-			1411	217.45' - Fracture, <5 deg, rough, undulating, loose	₩	covering 30-40% of surface, becoming very thinly laminated with	130. 5 minutes
22 <u>5</u> -182.7	225.0			218.3' - Fracture, horizontal, smooth,	┯	— depth	_
-			>10	stepped, loose 218.45-219.3' - Fracture zone, 0-90 deg,	┲	No Recovery 209.85-210.0' Limestone	-
_				smooth to rough, undulating, loose 219.3' - Fracture, <5 deg, rough, stepped,	口	<ul> <li>210.0-210.6' - Same as</li> <li>208.7-209.85' except voids &lt;10%</li> </ul>	-
-			3	loose	ш	210.6-211.4' - yellowish gray, (5Y	-
-	R39-HQ		. 40	220.01-220.45' - Fracture zone, various orientations	Ш	<ul> <li>7/2), very fine to fine grained, moderate HCl reaction, very weak</li> </ul>	-
	5 ft 70%	12	>10	220.85' - Fracture, 50 deg, rough, stepped, loose	Ш	(R1), cobble- to gravel-sized limestone, voids up to 1/16" covering	
			>10	221.2' - Fracture, 20 deg, smooth, planar,	Ш	20-30%, trace fossil mold/casts	]
_				loose 221.65' - Fracture, 60 deg, rough, undulating,	$\perp$	211.4-213.3' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2),	D00: 7
-			NR	loose 221.85' - Fracture, <5 deg, rough, stepped to	$oxed{\Box}$	extremely weak (R0), voids and cavities up to 1"x1-3/16" cover 100%	R39: 7 minutes
230_ -187.7	230.0			undulating, loose –	$oxed{\Box}$	<ul> <li>of surface, fossil molds/casts</li> </ul>	-
			>10	222.3' - Fracture, 0-50 deg, rough, stepped, loose	$\blacksquare$	213.3-214.0' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2),	-
-				222.55-222.7, 222.9 - 223.1' - Fracture zone, horizontal, rough, stepped, loose	仠	<ul> <li>fine grained, weak (R2), interlaminated with very fine grained,</li> </ul>	-
-			>10	225.0-226.0' - Fracture zone, limestone	텎	weak (R2) limestone	-
-	R40-HQ		0	fragments, various orientations 226.55' - Fracture, horizontal, rough,	Ħ	L No Recovery 214.0-215.0' Limestone	1
-	5 ft 48%	8		stepped, loose 226.7, 226.85' - Fractures (2), horizontal,	$\parallel$	215.0-218.4' - yellowish gray, (5Y 7/2), very fine to fine grained,	
				smooth, planar, loose	]#	moderate HCl reaction, very weak to	]
			NR	227.1-227.6' - Fracture zone, 0-90 deg, rough, stepped	Ш	weak (R1 to R2), coarser grained limestone with voids and cavities up	
				227.6' - Fracture, horizontal, smooth, loose	oxdot	to 3/8"x3/16" over 30-40% of surface, fossiliferous (molds/casts).	R40: 5 minutes
235	235.0			227.6-227.8' - Fracture, vertical, rough, stepped, tight	Щ	iossilietous (moius/casts),	
							<u>I</u>



PROJECT NUMBER:

33884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

ORIENTATION: Vertical

WATER	LEVELS: 1.6	1 ft b	gs on 6	6/14/07 START : 4/24/2007 END :	5/1/2007	LOGGER : C. Dougherty, R. McC	omb
≥∩≘	_ (6			DISCONTINUITIES	_ ပွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-192.7      	R41-HQ 5 ft 20%	0	>10 NR	227.8-228.8' - Fracture zone, 0-90 deg, rough, stepped to undulating, loose 230.1' - Fracture, 0-40 deg, rough, stepped, loose 230.7' - Fracture, 30 deg, smooth to rough, stepped, loose 230.7-232.4' - Fracture zone, 0-90 deg, smooth to rough, stepped to planar, loose to tight 235.0-236.0' - Fracture zone, 0-90 deg, smooth to rough, stepped to planar, loose to tight		218.4-219.9' - yellowish gray, (5Y - 7/2), fine grained, weak (R2), with gravel- to cobble-sized, angular limestone rock fragments (very fine grained, weak (R2)), voids/cavities up to 3/4"x3/4" over 15-20% of surface  No Recovery 219.9-220.0' Limestone 220.0-220.1' - yellowish gray, (5Y - 7/2), very fine grained, strong HCI reaction, weak (R2), no voids/cavities Limestone 220.1-220.5' - dusky yellow, (5Y 6/4), moderate HCI reaction, weak to very weak (R2 to R1), cavities/voids up to	R41: 4 minutes
-197.7 	R42-HQ 5 ft 54%	8	>10 >10 2 NR	240.0-242.0' - Fracture zone, 0-90 deg, smooth to rough, stepped to planar, loose to tight  242.0' - Fracture, 0-30 deg, rough, undulating 242.2' - Fracture, 0-30 deg, rough, undulating, loose		3/8"x3/8" over 20-30%, sharp contact with underlying limestone 220.5-221.9' - yellowish gray and light olive brown, (5Y 7/2 and 5Y 5/6), mottled, very weak (R1), voids over 10-15%, cavities up to 3/8"x3/16" 221.9-223.3' - yellowish gray, (5Y 7/2), fine grained, mild HCI reaction, very weak (R1), voids and cavities up to 3/8"-3/4" x 3/8"-3/4" over 70-80% of surface. Very fine grained limestone in fine grained matrix	R42: 5 minutes
245 -202.7 - - - - - - - - - 250 -207.7	245.0 R43-HQ 5 ft 16%	0	>10	245.0-245.8' - Fracture zone, various orientations, gravel and cobble sized rock fragments		No Recovery 223.3-225.0'  Limestone  225.0-228.5' - yellowish gray, (5Y 7/2), extremely weak to weak (R0 to R2), fossiliferous (cast/molds), becoming predominantly gravel to sand-sized limestone fragments, - cavities up to 3/4" to 1-3/16" in diameter, thinly laminated, with few voids (<15%) from 226.5-226.9'  No Recovery 228.5-230.0' Limestone  230.0-232.4' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to strong HCI reaction, weak to very weak (R2 to R1), trace fossil molds/casts, voids (<1/16")	R43: 2 minutes
- - - - - -	R44-HQ 5 ft 18%	0	>10 NR	250.0-250.9' - Fracture zone, various orientations, gravel and cobble sized rock fragments		covering 5-10% with occasional 20-30% coverage in fine grained limestone No Recovery 232.4-235.0' Limestone 235.0-236.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCI reaction, very weak (R1), voids <1/1/6" over 50-60% of surface No Recovery 236.0-240.0'	R44: 4 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-20	SHEET	14	OF	14	

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723068.1 N, 458060.9 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 1.6	31 ft b	gs on (	6/14/07 START : 4/24/2007 END : 5/	1/200	D7 LOGGER : C. Dougherty, R. McComb
>00	(9)			DISCONTINUITIES	9	LITHOLOGY COMMENTS
ANE (#	7.4.Y 0.8.		ES	DESCRIPTION	2.00	ROCK TYPE, COLOR, MINERAL OCY, TEXTURE SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) O	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	WEATHERING, HARDNESS,  FLUID LOSS, CORING RATE AND
DEP] SURF	COR	ROI	FRAC PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMI	AND ROCK MASS CHARACTERISTICS  SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-212.7						Limestone
-			NA	-		240.0-242.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl
-			NIA	-		reaction, very weak (R1), voids
1 [			NA		$\mathbf{L}$	typically 1/16" or less over 60-70% surface, rare cavities (3/8"x3/8"),
_	R45-HQ 5 ft	0	>10	257.2-257.7' - Fracture zone, 0-90 deg, smooth to rough, undulating to stepped -	Ш	fossil casts/molds rare, sandy/friable texture, 1 to 2 thin very fine grained
_	54%			-	血	limestone laminae 241.0-242.0   No Recovery 242.7-245.0'
-				-		Limestone -
-			NR	-	Ь	245.0-245.8' - Same as 240.0-242.7'
	000.0			-		Limestone 250.0-250.9' - Same as 245.0-245.8'
260_ -217.7	260.0			260.0-267.7' - Fracture zone, 0-90 deg,	oxdot	No Recovery 250.9-255.0'
-			>10	rough, stepped to undulating, loose, gravel - sized rock fragments	F	- Poorly Graded Sand (SP) - 255.0-256.8' - dusky yellow to light
1 -			>10		F	olive brown, (5Y 6/4 to 5Y 5/6), wet, loose, mild to moderate HCl reaction,
				_	H	very poorly sorted, silty to clayey
-	R46-HQ 5 ft	0		<u>-</u>	F	Silt With Limestone Fragments (ML)  256.8-257.2' - pale greenish yellow,
-	34%			-	Ħ	_ (10Y 8/2), wet, loose
-			NR	-		Limestone 257.2-257.7' - yellowish gray, (5Y
-				-	Ħ	_ 7/2), moderate to mild HCl reaction, very weak (R1), fossiliferous, molds
265	265.0			-	Ħ	and casts, voids and cavities
-222.7	265.0				<u> </u>	No Recovery 257.7-260.0' Limestone
-				-	1	260.0-261.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl
						reaction, very weak (R1), voids - <1/16" over 50-60%, cavities typically -
_				_		3/16"x3/8", fossiliferous (mold/casts)
_				-		261.0-261.7' - pale greenish yellow, (10Y 8/2), very fine grained, mild to
-				-	1	moderate HCl reaction, very weak (R1), becoming silty to sandy, soft,
-				-	┨	and loose with depth
-				-	1	No Recovery 261.7-265.0'  Bottom of Boring at 265.0 ft bgs on
-				-	1	- 5/1/2007
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PROJECT NUMBER:	BORING NUMBER:

338884.FL A-21

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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-7/8 wing bit

ORIENTATION: Vertical

WATER LEVELS: 4.72 ft bgs on 3/12/07 S					-	D . C	URIENTATION : VEILICAI		
			START : 3/11/2007	END: 3/20/2007 SOIL DESCRIPTION		R.C.	LeBlanc, M. Faurote  COMMENTS		
≥⊕£ I	STANDARD PENETRATION PENETRATION TEST PENETRATION			STANDARD PENETRATION	SOIL DESCRIPTION			8	OOWIIVILIYIO
AN (	SAMPLE INTERVAL (ft)		TEST RESULTS		SOIL NAME	E, USCS GROUP SYME	ROL COLOR	CL	DEPTH OF CASING, DRILLING RATE,
H BI ACE ATIC		RECOVE	RY (ft)		MOISTURE	CONTENT, RELATIVE	DENSITY OR	30L	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	CONSISTENC	CY, SOIL STRUCTURE,	MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
当の回 42.4				(N)				S	Start with 2-7/8" bit
42.4								4	Start with 2-7/8 bit
I _								1	_
									J. Schaffer and Le Blanc start logging
								1	]
_								1	1
-								1	<u> </u>
-								1	-
-	3.5				Silty Sand (SM	<u> </u>		1111	-
_				4-3-3	3.5-4.6' - yellow	vish gray, (5Y 7/2), mo	ist to wet, loose,	-111	-
_		1.1	SS-1	(6)	very fine to fine	grained, no HCl reac	tion, trace		_
5	5.0				\fragments, sand	low plastic fines, trace d is silica	organics, root		
37.4					(	<u> </u>	/	]	_
									]
								1	]
_								1	1
-								1	<u>-</u>
_								1	-
_								-	-
_	8.5				Cil4 (MI )			+	-
_				4-8-13	<b>Silt (ML)</b> 8.5-9.5' - dark v	ellowish orange, (10y	R 6/6), wet, verv	4111	-
_		1.0	SS-2	(21)	stiff, nonplastic,	, very rapid dilatancy,	mild to moderate	Ш	_
10	10.0			, ,	HCl reaction, ve	ery strong (R5), 5-10%	very fine to fine	J	_
32.4					Saria, carbonate	c materials			Driller's Remark: Harder drilling at 10.5'
								1	]
								1	]
_								1	1
-								1	<u>-</u>
-								1	-
-								1	
-	13.5			47.50/0	Silt (ML)			╂	-
-	14.3	0.8	SS-3	17-50/3 (67/9")	13.5-14.3' - dar	k yellowish orange, (1	0YR 6/6), wet,		-
-	14.3			(5.70)	hard, nonplastic	<ul><li>c, very rapid dilatancy,</li></ul>	mild to	Щ	
15					\ moderate HCl r	eaction, 13% very fine	e to fine	1	<u>                                     </u>
27.4					January Sizou gran	··· <del>·</del>	/	]	Driller's Remark: Slight circulation loss at 15.0'
									10.0
1 7								1	]
								1	]
-								1	
-								1	
-								-	-
-	18.5	0.4	CC 4	50/5	Limostono Erro	amonte		+	-
-	18.9	0.1	SS-4	50/5 (50/5")	Limestone Frag 18.5-18.6' - yell	gments Iowish gray, (5Y 8/1), ı	mild to moderate	1	
_				[	\HCl reaction, hi	ighly fossiliferous		1	
20									



PROJECT NUMBER:	BORING NUMBER:

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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-7/8 wing bit ORIENTATION: Vertical

WATER LEVELS : 4.72 ft bgs on 3/12/07				12/07	START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote				
	STANDARD				SOIL DESCRIPTION	G	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME LIGOS CROUP OVARDOL COLOR	SYMBOLIC LOG			
H BE ACE ATIO	RECOVERY (ft)			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30LI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
EPT SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYME	INSTRUMENTATION		
22.4				(14)		1			
-					-	1	-		
-					-	1	-		
-					-	1	<u> </u>		
-					-	1	<u> </u>		
_	23.5					ļ.,,	_		
_				17-26-20	Silt With Sand (ML) 23.5-25.0' - dark yellowish orange, (10YR 6/6), moist -	1	_		
_		1.5	SS-5	(46)	to wet, hard, nonplastic, rapid dilatancy, mild to	$\  \ $	-		
25 17.4	25.0				moderate HCl reaction, 15% very fine to medium sand-sized grains, all carbonate	Ш			
17.4					-	┨	-		
-					-	┨	-		
-					-	┨	-		
-					<del>-</del>	┨	-		
-					-	1	-		
-	28.5				<del>-</del>	1	-		
-	20.0				Silty Sand With Gravel (SM)		<u>-</u>		
-		1.1	SS-6	3-2-2 (4)	28.5-29.6' - moderate yellowish brown, (10YR 5/4), wet, very loose, fine to coarse grained, mild HCl		<u> </u>		
30	30.0			(1)	reaction, 25% fine gravel-sized, 39% nonplastic fines, gravel-sized material appears to be limestone	]	_		
12.4					fragments	1	_		
_					<u>-</u>	1	_		
-					-	-	-		
-					-	-	-		
-					-	1	-		
-	22.5				-	ł	-		
-	33.5			00.00 :-	Gravelly Silt With Sand (ML)	Ш	·		
-		0.8	SS-7	26-36-50/2 (86/8")	33.5-34.25' - dark yellowish orange to dark olive gray, (10YR 6/6 to 5Y 5/2), wet, hard, nonplastic, very rapid	1	-		
35	34.7			, ,	dilatancy, strong HCl reaction, 30% fine gravel-sized	╫	·		
7.4					limestone fragments, 20% fine to coarse sand, mild to moderate HCl reaction for limestone	1	_		
1 -						1			
-					_	1			
-					-	1	-		
-					-	1	-		
-	38.5			07.50/5		1111	-		
-	39.4	0.9	SS-8	37-50/5 (87/11")	-	1	-		
- 40	- 55.4				[-	╀╨	1 -		
40					1.	t			
						1			



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-7/8 wing bit ORIENTATION: Vertical

WATER LEVELS : 4.72 ft bgs on 3/12/07				12/07	START : 3/11/2007 END : 3/20/2007 LOGGE	R : C	: C. LeBlanc, M. Faurote		
				STANDARD	SOIL DESCRIPTION	g	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE INTERVAL (ft)			PENETRATION TEST RESULTS	COLL NAME TIGOGO COCCIO CATABOLI COCCO	SYMBOLIC LOG	DEDTIL OF CACING POULTING DATE		
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	S Lice	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND		
EPT URF LEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	3Y ME	INSTRUMENTATION		
2.4				(11)	Silty Sand (SM)	+"			
-					38.5-39.4' - moderate yellowish brown, (10YR 5/4), moist to wet, very dense, very fine to medium grained,	1	1		
-					mild to moderate HCl reaction, 35-40% nonplastic	1	-		
					fines, trace organics and/or black minerals, appears massive with no bedding, carbonate materials				
_							_		
_						4	_		
-	43.5				Silty Gravelly Sand (SM)	1111	_		
-	44.4	0.8	SS-9	47-50/5 (97/11")	43.5-44.3' - moderate yellowish brown, (10YR 5/4),	-	-		
-	44.4			(- )	moist to wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 30% fine to coarse	1111	1 -		
45 -2.6					gravel-sized limestone fragments, 20% nonplastic fines, all carbonate materials	1	-		
-					lines, an earbonate materials	1	1		
_						1	1		
							]		
_						1			
_						4	_		
-	48.5				Silty Sand With Gravel (SM)	1111			
-		0.9	SS-10	2-2-20	48.5-49.4' - moderate vellowish brown to dark	-	1		
50 50	50.0	0.5	00-10	(22)	yellowish brown, (10YŔ 5/4 to 10YR 4/2), wet, medium dense, fine to coarse grained, mild HCl	╫	1 -		
-7.6	30.0				reaction, 25% fine to coarse gravel-sized limestone fragments, 20% nonplastic fines, all carbonate	1	-		
_						1	_		
_						-	_		
-						-	-		
-	53.5				Silty Sand With Gravel (SM)		+		
-		1.5	SS-11	9-22-14	53.5-55.0' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to10YR 4/2), wet, dense,	1	1		
55	55.0			(36)	fine to coarse grained, mild HCl reaction, 20% fine	1	1		
-12.6					gravel-sized limestone fragments, 25% nonplastic fines, trace organics, all carbonate	<b>]</b>	1 7		
							]		
_						1	]		
-						-	-		
-						-	-		
-	E0 F					1	-		
-	<b>-58:</b> 5	0.0	SS-12	50/1		╆	No chatter, smooth drilling		
-				(50/1")	\ 58.5' - few coarse sand-sized limestone fragments \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1	1		
60						1	1		
							1		



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## **SOIL BORING LOG**

SHEET 4 OF 11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-7/8 wing bit ORIENTATION: Vertical

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PROJECT NUMBER:	BORING NUMBER:

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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-7/8 wing bit

ORIENTATION: Vertical

SOIL DESCRIPTION PENETRATION TEST RESULTS RECOVERY (ft)  -37.6  -37.6  -38.5  -42.6  -38.5  -42.6  -39.9  -30.0  -	SOLD DESCRIPTION  SOLD DESCRIPTION  SOLD DESCRIPTION  COMMENTS  CO	\A/ATED	ובעבופ	. 4 70 6 4				y, auto nammer, Avvi rous			_	ORIENTATION : VEILICAI	
SAPPLE INTERVAL (ii)	SAPER   SAMPLE NTERVAL (R)   RECOVERY (R)   RECOV	WATER	LEVELS	. 4.12 T( l	yys on 3/1		START : 3/11/2007	END: 3/20/2007	LUG	GEK :	U.		
Significant drill chatter 80-82'   Driller's Remark: 82-83.5', soft drilling	Significant drill chatter 80-82	\$⊕£1	044:5:			STANDARD PENETRATION		SOIL DESCRIPTION		$\dashv$	8	OCIVIIVILINIO	
Significant drill chatter 80-82'   Driller's Remark: 82-83.5', soft drilling	Significant drill chatter 80-82	N (	SAMPLE		. ,	TEST RESULTS	SOIL NAME	E LISCS GROUP SYMBO	LCOLOR		S S	DEPTH OF CASING DRILLING RATE	
Significant drill chatter 80-82'   Driller's Remark: 82-83.5', soft drilling	Significant drill chatter 80-82	A B B B B		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		MOISTURE CONTENT, RELATIVE DENSITY OR			ᇗ┃	DRILLING FLUID LOSS, TESTS, AND
Significant drill chatter 80-82'   Driller's Remark: 82-83.5', soft drilling	Significant drill chatter 80-82	[ 문문]			#TYPE		CONSISTENC	CY, SOIL STRUCTURE, M	IINERALOGY		Ĭ	INSTRUMENTATION	
83.5  84.4  0.8  SS-17  47-50/5 (97/11")  83.5-84.3 - moderate yellowish brown, (10/R 5/4), wet, very dense, fine to coarse grained, mild HCl reaction, 32% fine to coarse gravel-sized limestone fragments, 19% nonplastic fines, all carbonate  Sporadic drill chatter 85-87'  Driller's Remark: 82-83.5', soft drilling  Sporadic drill chatter 85-87'  Driller's Remark: "Softened considerably"  88.5-89.0 - moderate yellowish brown, (10/R 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Sility Gravelly Sand (SM)  88.5-89.0 - moderate yellowish brown, (10/R 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Sility Gravelly Sand (SM)  88.5-89.0 - moderate yellowish brown, (10/R 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Sility Gravelly Sand (SM)  88.5-89.0 - moderate yellowish brown, (10/R 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Sility Gravelly Sand (SM)  88.5-89.0 - moderate yellowish brown, (10/R 5/4), with HCl reaction, 20/8 soft soft gravel sized grains, sharp contact at bottom  Sility Gravelly Sand (SM)  88.5-89.0 - moderate yellowish brown, (10/R 5/4), with HCl reaction, 20/8 soft gravel sized grains, sharp contact at bottom  Sility Gravelly Sand (SM)  Sporadic drill chatter 85-87'  Drill chatter 87-88'  Dr	83.5   0.8   SS-17   47-50/5   Sitty Gravelly Sand (SM)   83.5-84.3" - moderate yellowish brown, (10YR 6/4), wet, very dense, fine to coarse granted, mild HCI reaction, 32% fine to coarse granted, mild HCI reaction, 32% fine to coarse granted, mild HCI reaction, 32% fine to coarse granted, mild HCI reaction, 32% fine to coarse granted, mild HCI reaction, 32% fine to coarse granted, mild HCI reaction, 12% fine to soarse granted, mild HCI reaction, 12% fine to soarse granted, mild HCI reaction, 12% fine to soarse granted, mild HCI reaction, 10, 15% very fine sand-sized grains, sharp (contact at bottom Sility Gravelly Sand (SM) (89.0-83.5" - 3ame as 33.5-84.3"   Driller's Remark: "Softened considerably" 88-8.5"	ESE				(N)					Ś		
83.5   83.5   84.4   0.8   SS-17   47-50/5 (97/11")   Silty Gravelly Sand (SM)   83.5-84.3" - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 101YR 5/4), wet, very dense, fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI	83.5  84.4  0.8 SS-17  47-50/5  85.18  87-215  88.5  1.0 SS-18  7-2-15  (17)  Silt (ML)  85.5-84.3  1.0 SS-18  7-2-15  (17)  Silt (ML)  SS-18  7-2-15  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  SS-18  SS-18  SS-18  Silt (ML)  SS-18  S	-37.6									- 1	Significant drill chatter 80-82'	
83.5   83.5   84.4   0.8   SS-17   47-50/5 (97/11")   Silty Gravelly Sand (SM)   83.5-84.3" - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 101YR 5/4), wet, very dense, fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI	83.5  84.4  0.8 SS-17  47-50/5  85.18  87-215  88.5  1.0 SS-18  7-2-15  (17)  Silt (ML)  85.5-84.3  1.0 SS-18  7-2-15  (17)  Silt (ML)  SS-18  7-2-15  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  SS-18  SS-18  SS-18  Silt (ML)  SS-18  S									1	- 1		
83.5   83.5   84.4   0.8   SS-17   47-50/5 (97/11")   Silty Gravelly Sand (SM)   83.5-84.3" - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 101YR 5/4), wet, very dense, fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI	83.5  84.4  0.8 SS-17  47-50/5  85.18  87-215  88.5  1.0 SS-18  7-2-15  (17)  Silt (ML)  85.5-84.3  1.0 SS-18  7-2-15  (17)  Silt (ML)  SS-18  7-2-15  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  SS-18  SS-18  SS-18  Silt (ML)  SS-18  S	1 7								- 1	- 1		
83.5   84.4   0.8   SS-17   47-50/5 (97/11")   83.5-84.3' - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 101 reaction, 20% coarse grained, mild HCI reaction, 101 reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 101 reaction, 20% coarse grained, mild HCI reaction, 101 rea	83.5  84.4  0.8 SS-17  47-50/5  85.18  87-215  88.5  1.0 SS-18  7-2-15  (17)  Silt (ML)  85.5-84.3  1.0 SS-18  7-2-15  (17)  Silt (ML)  SS-18  7-2-15  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  SS-18  SS-18  SS-18  Silt (ML)  SS-18  S									- 1	- 1		
83.5   83.5   84.4   0.8   SS-17   47-50/5 (97/11")   Silty Gravelly Sand (SM)   83.5-84.3" - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 101YR 5/4), wet, very dense, fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 32% fine to coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI reaction, 20% coarse grained, mild HCI	83.5  84.4  0.8 SS-17  47-50/5  85.18  87-215  88.5  1.0 SS-18  7-2-15  (17)  Silt (ML)  85.5-84.3  1.0 SS-18  7-2-15  (17)  Silt (ML)  SS-18  7-2-15  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  SS-18  Silt (ML)  SS-18  SS-18  SS-18  SS-18  SS-18  SS-18  Silt (ML)  SS-18  S									- 1	- 1	Driller's Remark: 82-83 5' soft drilling	
84.4   0.8   SS-17   47.50/5 (877/11")   Silty Gravelly Sand (SM)   ss. 5-8.3 - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCl reaction, 32% fine to coarse gravel-sized limestone fragments, 19% nonplastic fines, all carbonate   Sporadic drill chatter 85-87'	84.4 0.8 SS-17 47-50/5 (97/11')  85.5 42.6 SS-17 47-50/5 (97/11')  88.5 SS-18 (97/11')  88.5 SS-18 (97/11')  88.5 SS-18 (1.0 SS-18 (1.7) SS-19 (1.7) S									1	- 1	Dimor of Normanic of Co.C., Containing	
84.4   0.8   SS-17   47.50/5 (877/11")   Silty Gravelly Sand (SM)   ss. 5-8.3 - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCl reaction, 32% fine to coarse gravel-sized limestone fragments, 19% nonplastic fines, all carbonate   Sporadic drill chatter 85-87'	84.4 0.8 SS-17 47-50/5 (97/11')  85.5 42.6 SS-17 47-50/5 (97/11')  88.5 SS-18 (97/11')  88.5 SS-18 (97/11')  88.5 SS-18 (1.0 SS-18 (1.7) SS-19 (1.7) S	1 4								4	- 1		
84.4 0.8 SS-17 (97711)  83.5-84.3 - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCl reaction, 32% fine to coarse gravel-sized limestone (fragments, 19% nonplastic fines, all carbonate)  88.5 1.0 SS-18 7-2-15 (17) SS-18 (17) Sitt (ML) 88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl veraction, 10-15% very fine sand-sized grains, sharp (contact at bottom) Sitty Gravelly Sand (SM) (Sity Gravelly Sand (SM) (Sity Gravelly Sand (SM) (Sity Gravelly Sand (SM) (Sity Gravelly Sand (SM) (Sity Gravelly Sand (SM) (HW)); changed to 3-7/8" bit 195.93.5' - same as 83.5-84.3'  Limestone Fragments (S0.2') Sity Gravelly Sand (SM) (HW); changed to 3-7/8" bit 195.93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") very fine specific fine gravel-sized limestone fragments (HW); changed to 3-7/8" bit 195.93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") very fine gravel-sized limestone fragments urfaces, several fine gravel-sized limestone fragments	84.4 0.8 SS-17 (97/11*)  83.5-84.3 "moderate yellowish brown, (10YR 5/4), wet, very doese, fine to coarse grained, mild HCI reaction, 32% fine to coarse gravel-sized limestone (fragments, 19% nonplastic fines, all carbonate)  88.5 1.0 SS-18 7-2-15 (17) SS-18 (17) SS-18 (17) SS-19 (18) SS-19.0 "moderate yellowish brown, (10YR 5/4), wet stiff, low plasticity, rapid dilatancy, mild HCI reaction, 10-15% very fine sand-sized grains, sharp (contact at bottom (Sity Garvelly Sand (SM)) (89.0-89.5 - Same as 83.5-84.3")  90. 90. 1.0 SS-19 (50/2")  90. 90. 1.0 SS-19		83.5										
wet, very dense, fine to coarse grained, mild HCl reaction, 32% fine to coarse grained, mild HCl reaction, 32% fine to coarse grained, mild HCl reaction, 32% fine to coarse grained, mild HCl reaction, 32% fine to coarse grained, mild HCl reaction, 32% fine to coarse grained, mild HCl reaction, 12% nonplastic fines, all carbonate  Sporadic drill chatter 85-87'  Drill chatter 87-88'  Driller's Remark: "Softened considerably" 88-88.5'  Sporadic drill chatter 85-87'  Drill chatter 87-88'  Driller's Remark: "Softened considerably" 88-88.5'  Sporadic drill chatter 85-87'  Drill chatter 87-88'  Driller's Remark: "Softened considerably" 88-88.5'  Sporadic drill chatter 85-87'  Drill chatter 87-88'  Driller's Remark: "Softened considerably" 88-88.5'  Circulation loss at 90' Water level on 3/12/07 at 08:00 4.72' from top of 10" casing Set 15' of "casing then set 90' of 4" casin (HW); changed to 3-7/8" bit  Limestone Fragments  93.5 - 3.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") Voids on fragment surfaces, several fine gravel-sized limestone fragments	### ### ### ### ### ### ### ### ### ##			0.0	SS 17		Silty Gravelly S	Sand (SM)	(40)(D E(4)				
reaction, 32% fine to coarse gravel-sized limestone fragments, 19% nonplastic fines, all carbonate  Sporadic drill chatter 85-87'  Drill chatter 87-88'  Driller's Remark: "Softened considerably" 88-88.5'  88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Silty Gravelly Sand (SM)  89.0-89.5' - Same as 83.5-84.3'  Circulation loss at 90' Water level on 3/12/07 at 08:00 4.72' from top of 10' casing Set 15' of 6' casing then set 90' of 4" casin (HW); changed to 3-7/8" bit  Limestone Fragments 93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16') voids on fragment surfaces, several fine gravel-sized limestone fragments	Preaction, 32% fine to coarse gravel-sized limestone   Pragments, 19% nonplastic fines, all carbonate   Pragments, 19% nonplastic fin		84.4	0.6	33-17	(97/11")	83.5-84.3' - mod	derate yellowish brown,	(10YR 5/4), mild HCl				
Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 87-88'   Drill chatter 87-88'   Driller's Remark: "Softened considerably" 88-8-8.5'   88-5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Sitty Gravelly Sand (SM)	Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 85-87'   Sporadic drill chatter 87-88'   Drill chatter 87-88'   Drill chatter 87-88'   Drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Drill chatter 87-88'   Sporadic drill chatter 87-88'   Drill chatter 87-88'   Sporadic drill chatter 87-88'   Sporadic drill chatter 87-88'   Drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Drill chatter 87-89'   Sporadic drill chatter 87-89'   Drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Drill chatter 87-89'   Sporadic drill chatter 87-89'   Drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Drill chatter 87-89'   Sporadic drill chatter 87-89'   Drill chatter 87-89'   Sporadic drill chatter 87-89'   Drill chatter 87-89'   Sporadic drill chatter 87-89'   Sporadic drill chatter 87-89'   Dri						\ reaction, 32% f	ine to coarse gravel-size	ed limestone	/1	- 1		
88.5  1.0 SS-18  7-2-15  90 90.0  47.6  1.0 SS-18  7-2-15  (17)  88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCI reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Sitty Gravelly Sand (SM)  89.0-89.5' - Same as 83.5-84.3'  Circulation loss at 90' Water level on 3/12/07 at 08:00 4.72' from top of 10" casing Set 15' of 6" casing then set 90' of 4" casin (HW); changed to 3-7/8" bit  Limestone Fragments  93.5  -52.6  Drill chatter 87-88'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatter 87-86'  Drill chatte	88.5   Drill chatter 87-88'						\fragments, 19%	6 nonplastic fines, all car	bonate	_/	- 1	Sporadic drill chatter 85-87'	
88.5  1.0 SS-18 7-2-15 (17)  90 90.0  -47.6  -48.5  1.0 SS-18 7-2-15 (17)  Silt (ML)  88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Silty Gravelly Sand (SM)  89.0-89.5' - Same as 83.5-84.3'  Circulation loss at 90'  Water level on 3/12/07 at 08:00 4.72' from top of 10' casing Set 15' of 6' casing then set 90' of 4" casin (HW); changed to 3-7/8" bit  Limestone Fragments  9552.6  Silt (ML)  88.5-89.0' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments	88.5   1.0   SS-18   7-2-15   88.5-89.0" - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCI reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Silty Gravelly Sand (SM)   89.0-89.5" - Same as 83.5-84.3"   Circulation loss at 90"   Water level on 3/12/07 at 08:00 4.72" from to 96.10"   Society of 10" casing Set 15" of 6" casing then set 90" of 4" casing (HW); changed to 3-7/8" bit   HCI reaction, 20% coverage of small (1/16")   voids on fragments surfaces, several fine gravel-sized limestone fragments   98.5   0.8   SS-20   37-50/4 (87/10")   Maintained circulation from 90-115"   Maintained circulation from 90-115"										- 1	oporadio dilii oriallor de di	
88.5  1.0 SS-18 7-2-15 (17)  90 90.0  -47.6  -48.5  1.0 SS-18 7-2-15 (17)  Silt (ML)  88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Silty Gravelly Sand (SM)  89.0-89.5' - Same as 83.5-84.3'  Circulation loss at 90'  Water level on 3/12/07 at 08:00 4.72' from top of 10' casing Set 15' of 6' casing then set 90' of 4" casin (HW); changed to 3-7/8" bit  Limestone Fragments  9552.6  Silt (ML)  88.5-89.0' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments	88.5   1.0   SS-18   7-2-15   88.5-89.0" - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCI reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Silty Gravelly Sand (SM)   89.0-89.5" - Same as 83.5-84.3"   Circulation loss at 90"   Water level on 3/12/07 at 08:00 4.72" from to 96.10"   casing Set 15" of 6" casing then set 90" of 4" casing (HW); changed to 3-7/8" bit   HCI reaction, 20% coverage of small (1/16")   voids on fragments surfaces, several fine gravel-sized limestone fragments   98.5   0.8   SS-20   37-50/4 (87/10")   Maintained circulation from 90-115"   Maintained circulation from 90-115"									- 4	- 1		
88.5  1.0 SS-18 7-2-15 (17)  90 90.0  -47.6  -48.5  1.0 SS-18 7-2-15 (17)  Silt (ML)  88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Silty Gravelly Sand (SM)  89.0-89.5' - Same as 83.5-84.3'  Circulation loss at 90'  Water level on 3/12/07 at 08:00 4.72' from top of 10' casing Set 15' of 6' casing then set 90' of 4" casin (HW); changed to 3-7/8" bit  Limestone Fragments  9552.6  Silt (ML)  88.5-89.0' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments	88.5   1.0   SS-18   7-2-15   88.5-89.0" - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCI reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Silty Gravelly Sand (SM)   89.0-89.5" - Same as 83.5-84.3"   Circulation loss at 90"   Water level on 3/12/07 at 08:00 4.72" from to 96.10"   casing Set 15" of 6" casing then set 90" of 4" casing (HW); changed to 3-7/8" bit   HCI reaction, 20% coverage of small (1/16")   voids on fragments surfaces, several fine gravel-sized limestone fragments   98.5   0.8   SS-20   37-50/4 (87/10")   Maintained circulation from 90-115"   Maintained circulation from 90-115"	<b>l</b> _									- 1		
88.5  1.0 SS-18 7-2-15 (17)  90 90.0  -47.6  -48.5  1.0 SS-18 7-2-15 (17)  Silt (ML)  88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Silty Gravelly Sand (SM)  89.0-89.5' - Same as 83.5-84.3'  Circulation loss at 90'  Water level on 3/12/07 at 08:00 4.72' from top of 10' casing Set 15' of 6' casing then set 90' of 4" casin (HW); changed to 3-7/8" bit  Limestone Fragments  9552.6  Silt (ML)  88.5-89.0' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments	88.5   1.0   SS-18   7-2-15   88.5-89.0" - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCI reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Silty Gravelly Sand (SM)   89.0-89.5" - Same as 83.5-84.3"   Circulation loss at 90"   Water level on 3/12/07 at 08:00 4.72" from to 96.10"   casing Set 15" of 6" casing then set 90" of 4" casing (HW); changed to 3-7/8" bit   HCI reaction, 20% coverage of small (1/16")   voids on fragments surfaces, several fine gravel-sized limestone fragments   98.5   0.8   SS-20   37-50/4 (87/10")   Maintained circulation from 90-115"   Maintained circulation from 90-115"										- 1		
Sitt (ML)   88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Sitty Gravelly Sand (SM)   89.0-89.5' - Same as 83.5-84.3'   Circulation loss at 90' Water level on 3/12/07 at 08:00 4.72' from top of 10" casing Set 15' of 6" casing then set 90' of 4" casin (HW); changed to 3-7/8" bit   93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments   limes	38.5   39.0   1.0   SS-18   7-2-15   (17)   88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Sitty Gravelly Sand (SM)   89.0-89.5 - Same as 83.5-84.3'   Sitty Gravelly Sand (SM)   89.0-89.5 - Same as 83.5-84.3'   Sitty Gravelly Sand (SM)   89.0-89.5 - Same as 83.5-84.3'   Sitty Gravelly Sand (SM)   Sitty Gravelly Sand (SM	7								1	- 1	Drill chatter 87-88'	
Sitt (ML)   88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Sitty Gravelly Sand (SM)   89.0-89.5' - Same as 83.5-84.3'   Circulation loss at 90' Water level on 3/12/07 at 08:00 4.72' from top of 10" casing Set 15' of 6" casing then set 90' of 4" casin (HW); changed to 3-7/8" bit   93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments   limes	38.5   39.0   1.0   SS-18   7-2-15   (17)   88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Sitty Gravelly Sand (SM)   89.0-89.5 - Same as 83.5-84.3'   Sitty Gravelly Sand (SM)   89.0-89.5 - Same as 83.5-84.3'   Sitty Gravelly Sand (SM)   89.0-89.5 - Same as 83.5-84.3'   Sitty Gravelly Sand (SM)   Sitty Gravelly Sand (SM	-								- 1	- 1		
Sitt (ML)   88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Sitty Gravelly Sand (SM)   89.0-89.5' - Same as 83.5-84.3'   Circulation loss at 90' Water level on 3/12/07 at 08:00 4.72' from top of 10" casing Set 15' of 6" casing then set 90' of 4" casin (HW); changed to 3-7/8" bit   93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments   limes	38.5   39.0   1.0   SS-18   7-2-15   (17)   88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Sitty Gravelly Sand (SM)   89.0-89.5 - Same as 83.5-84.3'   Sitty Gravelly Sand (SM)   89.0-89.5 - Same as 83.5-84.3'   Sitty Gravelly Sand (SM)   89.0-89.5 - Same as 83.5-84.3'   Sitty Gravelly Sand (SM)   Sitty Gravelly Sand (SM	-								- 1	- 1	Driller's Remark: "Softened considerably"	
1.0 SS-18 7-2-15 (17) 88.5-89.0' - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Sity Gravelly Sand (SM) 89.0-89.5' - Same as 83.5-84.3'  Limestone Fragments 93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments	88.5-88.0′ - moderate yellowish brown, (10YR 5/4), wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Sitty Gravelly Sand (SM)  89.0-89.5′ - Same as 83.5-84.3′  Limestone Fragments 93.5-93.6′ - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16″) voids on fragment surfaces, several fine gravel-sized limestone fragments  98.5  99.3  0.8  SS-19  SS-19  SS-19  SS-19  SO/2  (50/2″)  Maintained circulation from 90-115′  Maintained circulation from 90-115′	1 -	88.5				Cile (MI )				Н		
wet, stiff, low plasticity, rapid dilatancy, mild HCl reaction, 10-15% very fine sand-sized grains, sharp contact at bottom  Silty Gravelly Sand (SM) 89.0-89.5' - Same as 83.5-84.3'  Limestone Fragments 93.5	1.0   SS-18   (17)   wet, stiff, low plasticity, rapid dilatancy, mild HCI reaction, 10-15% very fine sand-sized grains, sharp contact at bottom   Sity Gravelly Sand (SM)   89.0-89.5' - Same as 83.5-84.3'   Sity Gravelly Sand (SM)   S9.0-89.5' - Same as 83.5-84.3'   Circulation loss at 90' Water level on 3/12/07 at 08:00 4.72' from top of 10" casing Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCI reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments   98.5   99.3   0.8   SS-20   37-50/4 (87/10")   Maintained circulation from 90-115'   Maintained circulation from 90-115'					7 2 15		derate vellowish brown.	(10YR 5/4).	, <b>.</b> [	Ш		
90 90.0  -47.6  -47.6  Silty Gravelly Sand (SM)  89.0-89.5' - Same as 83.5-84.3'  Limestone Fragments  93.5  93.7  0.1 SS-19  SS-19  SS-19  SS-26  Silty Gravelly Sand (SM)  89.0-89.5' - Same as 83.5-84.3'  Limestone Fragments  93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments	90 90.0   reaction, 10-15% very fine sand-sized grains, sharp   Circulation loss at 90'   Water level on 3/12/07 at 08:00 4.72' from top of 10' casing Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Sand (SM)   89.0-89.5' - Same as 83.5-84.3'   Sity Gravelly Sand (SM)   Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Sand (SM)   Sity Gravelly Sand (SM)   Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Sand (SM)   Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit   Sity Gravelly Set 15' of 6" casing then set 90' of 4" casing Set 15' of 6" casing then set 90' of 4" casing Set 15' of 6" casing then set 90' of 4" casing Set 15' of 6" casing then set 90' of 4" casing Set 15' of 6" casing then set 90' of 4" casing Set 15' of 6" casing then set 90' of 4" casing Set 15' of 6" casing then set 90' of 4" casing Set 15' of 6" casing then set 90' of 4" casing Set 15' of 6" casing then set 90' of 4" casing Set 15' of 6" casing then set 90' of 4" casing Set 15' of 6" casing Set 15' of 6" casing Set 15' of 6" casing Set 15' of 6" casing Set 15' of 6" casing Set 15' of 6" casing Set 15' of 6" casing Set 15' of 6" casing Set 15' of 6" casing Set 15' of 6" casing S	l _		1.0	SS-18		\ wet, stiff, low pl	lasticity, rapid dilatancy,	mild HCI				
-47.6 Sity Gravelly Sand (SM) 89.0-89.5' - Same as 83.5-84.3'  Limestone Fragments 93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments	Sity Gravelly Sand (SM)   89.0-89.5' - Same as 83.5-84.3'   Sity Gravelly Sand (SM)   89.0-89.5' - Same as 83.5-84.3'   Circulation loss at 90' Water level on 3/12/07 at 08:00 4.72' from top of 10" casing Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit	90	90.0			(,			grains, sharp	/ H			
89.0-89.5' - Same as 83.5-84.3'    89.0-89.5' - Same as 83.5-84.3'	89.0-89.5' - Same as 83.5-84.3'    89.0-89.5' - Same as 83.5-84.3'   Top of 10' casing Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit									J7 <b>T</b>			
Set 15' of 6" casing then set 90' of 4" casing (HW); changed to 3-7/8" bit    93.5	93.5 93.7 0.1 SS-19 50/2 (50/2")   Limestone Fragments 93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragments urfaces, several fine gravel-sized limestone fragments   Maintained circulation from 90-115'    98.5  98.5  98.5  98.5  98.5  98.7  0.1 SS-19 50/2 (50/2")   Maintained circulation from 90-115'   Mai						\89.0-89.5' - Sar	me as 83.5-84.3'		/ 1	- 1		
93.5 93.7 0.1 SS-19 (50/2")  Limestone Fragments 93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragments surfaces, several fine gravel-sized limestone fragments	93.5 93.7 0.1 SS-19 50/2 (50/2")  Limestone Fragments 93.5-93.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, 20% coverage of small (1/16") voids on fragment surfaces, several fine gravel-sized limestone fragments  Maintained circulation from 90-115'									-′ -{	- 1	Set 15' of 6" casing then set 90' of 4" casing	
95	95	-									- 1	(HW); changed to 3-7/8" bit	
95	95									4	١		
95	95										١		
95	95										١		
95	95		93.5							1	١		
yoids on fragment surfaces, several fine gravel-sized limestone fragments	95   voids on fragment surfaces, several fine gravel-sized   limestone fragments   Maintained circulation from 90-115'   98.5   99.3   0.8   SS-20   37-50/4 (87/10")	†	93:7	0.1	SS-19		☐ Limestone Fra	gments		7	ㅋ		
yoids on fragment surfaces, several fine gravel-sized limestone fragments	95   voids on fragment surfaces, several fine gravel-sized   limestone fragments   Maintained circulation from 90-115'   98.5   99.3   0.8   SS-20   37-50/4 (87/10")	-				(50/2")	93.5-93.6' - mo	derate yellowish brown,	(10YR 5/4),	/┨	١		
-52.6   limestone fragments	98.5  98.5  99.3  0.8 SS-20  37-50/4 (87/10")	-					woids on fragme	DR, 20% coverage of sm ent surfaces, several fin	ali (1/16") e gravel-sized	/-	١		
	98.5 Maintained circulation from 90-115'  98.5 99.3 0.8 SS-20 37-50/4 (87/10")						limestone fragn	nents	o graver-sized	$\square$	١		
Maintained circulation from 90-115'	98.5 - 99.3 0.8 SS-20 37-50/4 (87/10")	-52.6								_ 1	١		
Maintained circulation from 90-115'	98.5 - 99.3 0.8 SS-20 37-50/4 (87/10")										١		
	99.3 0.8 SS-20 37-50/4 (87/10")	]								1	١	Maintained circulation from 90-115'	
	99.3 0.8 SS-20 37-50/4 (87/10")									1	١		
	99.3 0.8 SS-20 37-50/4 (87/10")									$\dashv$	١		
	99.3 0.8 SS-20 37-50/4 (87/10")	-								- 1	١		
	99.3 0.8 SS-20 37-50/4 (87/10")									4	١		
	99.3 0.8 55-20 (87/10")		98.5										
1 1 0.8 155-201 (0=(10))	99.3 (87/10")			0.8	SS-20								
99.3 (8//10")	100	]	99.3			(87/10")	L				Ш		
		100								1	١		
		100					<b> </b>			-+	一		
											١		



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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-7/8 wing bit

DIVILLIIV	O IVIL III	OD / II VD	LQOII IVI	LINI . CIVIL 33 3/	14 5 10025, 111dd 10tai	y, auto naminer, Avvo ic	003, 2-770 WING DIL			ONLINIATION : Vertical
WATER	<b>LEVELS</b>	: 4.72 ft l	bgs on 3/	12/07	START : 3/11/2007	END: 3/20/2007	7 LOGO	GER:	C. <u>I</u>	_eBlanc, M. Faurote
1				STANDARD	<u> </u>	SOIL DESCRIPTION		<b> </b>	<u>,</u> [	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	Al (ff)	PENETRATION					SYMBOLIC LOG	
SEE	OAWII EE			TEST RESULTS	SOIL NAME	E, USCS GROUP SYME	BOL. COLOR.	2	2	DEPTH OF CASING, DRILLING RATE,
A P C P		RECOVE	ERY (ft)			CONTENT, RELATIVE		3	ğ <b>I</b>	DRILLING FLUID LOSS, TESTS, AND
E F 등			#TYPE	6"-6"-6"	CONSISTEN	CY, SOIL STRUCTURE	, MINERALOGY		፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟	INSTRUMENTATION
				(N)				í	ν.	
-57.6					Silty Gravelly S				П	
-	1				98.5-99.3' - mo	derate yellowish brow	n, (10YR 5/4),	11	- 1	Soft steady drilling with no chatter
-					wet, dense, fine	e to coarse grained, m	ild HCl reaction,	14	- 1	-
						arse gravel-sized mate el-sized material appea			- 1	_
					limestone fragn		ars to be		- 1	
-	1				Immotorio riagn	1101110		<b>┙</b> ┫	- 1	-
-									- 1	Clight drill shotter at 102 F!
1 _	]								- 1	Slight drill chatter at 102.5'
	103.5								- 1	
_				10 FO/F F	Silt With Sand	And Gravel (ML)		1	П	-
-	-	0.4	SS-21	10-50/5.5 (60/11.5")	↑ 103.5-103.9' - n	moderate yellowish bro	own, (10YR 5/4),	Æ	"	-
1 -	104.5			(00/11.5)		plastic, mild HCl reaction	on, interbedded	/ 📙	-	_
105						d sand-sized and fine	to coarse	/	-	
-62.6	1				graver-sized lim	nestone fragments		J <b></b>	-	Driller's Remark: Smooth soft drilling from
1 -	1							-	-	105' to 108.5'
1 -								4	-	-
									- 1	
	1							- 1	- 1	-
-	1							-1	- 1	<del>-</del>
_								- 4	- 1	-
									- 1	_
	108.5								- 1	
-	108.9	0.2	SS-22	50/5		aments		_	ᆸ	Minor chatter at 107' and 108'
-	100.3	U.L	00 22	(50/5")	108.5-108.7' - r	mild HCl reaction, coa	rse sand-sized	/-	- 1	-
l _	[				and fine to coar	rse gravel-sized limes	tone fragments	/ ]	- 1	_
110									- 1	
-67.6	1								- 1	Soft drilling from 110-112' with minor chatter,
-	-							- 1	- 1	maintained circulation -
_								- 4	- 1	<u>-</u>
									- 1	
_	1							1	- 1	_
-	1							- 1	- 1	Driller's Remark: Soft drilling at 112'
_								- 4	- 1	Minor chatter at 113'
1									-	
1 -	113.5				1			7	-	-
1 -	110.0				Silt With Sand	(SM)		<b>-</b> 1	П	Advanced 4" casing from 95' to 115' below
1 -	-	1.3	SS-23	21-12-20	113.5-115.0' - n	noderate yellowish bro	own, (10YR 5/4),	- 41	$\  \ $	ground surface.
1 -	14	1.3	33-23	(32)	wet, hard, nonp	olastic, rapid dilatancy,	, mild HCl			Ground water level on morning of 3/13/07 is
115	114.8	-		1	reaction, 20-25	% very fine sand-size	ed carbonate			4.69' below top of casing
-72.6	1					ered fine to coarse sar e gravel-sized limesto		71	٦	Maintained circulation from 115'
1 -	1				particles, coars	o gravor-sizeu iii ilestu	nic iraginiciilo	<b>√</b> ┨	-	115-117' Soft drilling with no chatter
1 -					1			4	-	-
1					1				-	
1 -					1			1	-	_
1 -	1							+	-	117-117.5', Sporadic minor drill chatter
1 -	-				1				-	Drill chatter 117.5'-118', softened 118'-118.5'
1 -					1				-	_
1	118.5								-	
1 -	1			0.00	1			11.	П	-
1 -	-	1.1	SS-24	8-30-50/1.5	1				$\  \ $	-
1 -	119.6	L		(80/7.5")	L			4	Ш	-
120									$\exists$	
			1						7	

ORIENTATION: Vertical



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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-7/8 wing bit

ORIENTATION: Vertical

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RILLING ME	HOD AND EQU	JIPMENT : CME 55 S	N 316625, mud rotary, auto hammer, AWJ rods, 2-7/8 wing b	it		ORIENTATION : Vertical
ATER LEVE	S: 4.72 ft bgs	on 3/12/07	START : 3/11/2007 END : 3/20/2007 LOG	GGER :	: C.	LeBlanc, M. Faurote
		STANDARD	SOIL DESCRIPTION		3	COMMENTS
SURFACE AND ELEVATION (#)	LE INTERVAL (ff)	) PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT. RELATIVE DENSITY OR		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
SURFA	_	YPE 6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBC	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
77.6			Silty Sand With Gravel (SM) 118.5-119.6' - moderate yellowish brown, (10YR 5/4 wet, very dense, mild HCl reaction, fine to coarse sand-sized limestone fragments, 20% gravel-sized limestone fragments, 15% nonplastic fines, all carbonate	),  -		Driller's Remark: Drill chatter 120-122', soft 122-123', drill chatter 123-123.5'
123.9 123.9 25 2.6		5-25 50/4 (50/4")	Silty Sand With Gravel (SM)  123.5-123.8' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, very dense, mild HCI reaction, fine to coarse sand-sized limestone fragments, 20% gravel-sized limestone fragments, 15% nonplastic fines, all carbonate			Chatter 125-126' Driller's Remark: Softened considerably on 126-128.5', circulation maintained to 136'
- - 128.9 - - - - - - - - - - - - - - - - - - -	1.1 SS	S-26 19-25-33 (58)	Silty Gravelly Sand (SM)  128.5-129.6' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, very dense, mild HCI reaction, fine to coarse sand-sized limestone fragments, 30% gravel-sized limestone fragments, 22% nonplastic fines, all carbonate			Driller's Remark: Soft 130-132.5' Driller's Remark: Harder 132-133.5', minor chatter observed on 133-133.5'
133.8 133.8 2.6		5-27 50/3 (50/3")	Silty Sand With Gravel (SM)  133.5-133.75' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, very dense, mild HCl reaction, fine to coarse sand-sized limestone fragments, 20% gravel-sized limestone fragments, 15% nonplastic fines, all carbonate			Steady chatter 135-138.5' Significant chatter 136-138.5'
- - - - - - - - - - - - - - - - - - -	0.2 SS	5-28, 50/2.5 (50/2.5")	Limestone Fragments  138.5-138.7' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, fine to coarse sand-sized fragments, few voids or fossils, trace black particles, possibly pyrite			Circulation loss at 136.5'  Very hard at 139.0'  End of soil boring at 139', begin rock coring
			Begin Rock Coring at 139.0 ft bgs See the next sheet for the rock core log			



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

ORIENTATION: Vertical

WATER	LEVELS: 4.7	2 ft b	gs on :	3/12/07 START : 3/11/2007 END : 3/2	20/20	07 LOGGER : C. LeBlanc, M. Faurot	e
				DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	QD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E		ŭ	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	ς	CHARACTERISTICS	<u> </u>
- 140 -97.6	139.0 R1-NQ 2.5 ft 80%	14	>10 5	139.0-140.0' - Fracture zone, multiple laminated wavy discontinuities and fractures 140.0' - Bedding plane or mechanical break, 10 deg, smooth, planar, tight		Limestone 139.0-141.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), 25% unfilled surface	Ground water level at 4.49' below top of casing - Le Blanc and T. Stewart start logging at 139' HW casing advanced to -
-			NR	140.2' - Bedding plane, 5 deg, smooth, planar, tight		voids (< 1/16") spheroidal to irregular shaped, thinly bedded to laminated,	138.5' R1: 29 minutes
_	141.5		2	140.7' - Bedding plane, 5 deg, rough, undulating, gray discoloration over 60% of	H	poorly fossiliferous (molds/casts) No Recovery 141.0-141.5'	-
-				surface, tight 140.9' - Bedding plane, 5 deg, rough, undulating, 1/4" fossil molds/casts on fracture	Ħ	Limestone - 141.5-142.3' - Same as 139.0-141.0' 142.3-143.9' - light olive gray, (5Y	-
-			2	surface 141.0' - Bedding plane or mechanical break,		5/2), medium grained, mild to moderate HCl reaction, 1/16" voids	-
- 145	R2-NQ 5 ft 48%	17	>10	rough, planar, fracture along bedding plane, open 1/16" 141.8' - Fracture, 80 deg, rough, undulating, stains over 20% of surface	Ħ	on 40% of surface, fine to medium carbonate subrounded granules, granular/sucrosic texture, traces of fine grain medium dark gray (N4)	Slight circulation loss at 144'
-102.6 -	146.5		NR	142.3-142.6' - Fracture zone, 1/4" to 3/4" rock fragments 143.1' - Bedding plane or mechanical break, horizontal, rough, undulating, open 2" 143.3' - Fracture, 50 deg, rough, undulating,		particles No Recovery 143.9-146.5'	R2: 46 minutes
-			>10	tight 143.6' - Fracture, 70 deg, rough, undulating, open		Limestone - 146.5-147.6' - Same as 142.3-143.9'	-
-	Do No		>10	143.6-143.9' - Fracture zone, 3/16" - 1-9/16" subangular rock fragments 146.6' - Fracture, 10 deg, rough, undulating,		147.6-150.6' - light olive gray, (5Y 5/2), fine to medium grained, moderate HCl reaction, medium	Harder drilling at 148'
-	R3-NQ 5 ft 82%	20	>10	open 1/8" 147.1' - Mechanical break, 5 deg, rough, undulating	F	strong (R3), 30-40% small (1/16") voids, trace of unfilled elongated (3/16" x 1/16") cavities, stains on	-
150_ -107.6 -			>10	147.2-147.6' - Fracture zone, rough, undulating, rock fragments — 147.8' - Fracture, 30 deg, smooth, undulating, trace staining of black speckles	Ħ	20% of surface, trace to 10% fine to medium grained medium dark gray (N4) particles	R3: 15 minutes
-	151.5		NR	148.2-148.7' - Fracture zone, 30-40 deg 148.2' - Fracture, 30-40 deg, rough, stepped,	Ħ	No Recovery 150.6-151.5'	
-			2	tight 148.7' - Fracture, 5 deg, rough, undulating, open 1/8"	H	Limestone - 151.5-155.8' - light olive gray with medium light gray and very pale	-
-			6	148.95' - Fracture, 5-10 deg, rough, undulating, pink discoloration, open 1/4" - 149.2' - Bedding plane, horizontal, rough,	Ħ	orange mottling, (5Y 5/2 with N6 and 10YR 8/2), fine grained, moderate to strong HCl reaction, medium strong	-
_	R4-NQ 5 ft 86%	23	>10	undulating, gray stains, open up to 1/2"  149.6' - Fracture, 40-45 deg, rough, undulating, trace black staining	岸	(R3), poorly fossiliferous, 1/16" voids on 25% of surface, massive bedding except laminated from 153.4-159.9'	-
155 -112.6 -			5	149.7-150.6' - Fracture zone, 40-50 deg, multiple 40-50 deg fractures and angular — fragments with black staining 150.25, 158.3' - Bedding plane (2),	Ħ	- - -	_
-	156.5		NR	horizontal, rough, undulating, tight  152.1' - Fracture, 25 deg, rough, undulating,	H	- No Recovery 155.8-156.5'	R4: 28 minutes
-			2	tight 152.3' - Fracture, 70 deg, rough, undulating, black stains over 85% of surface	Ħ	-	-
-			4	152.4' - Fracture, horizontal, rough, undulating, open 1/4"	F	- -	- -
_	R5-NQ			152.55' - Bedding plane, horizontal, rough, undulating, open 1/4"	Ė	-	-



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

ORIENTATION: Vertical

				IENT . CIVIE 33 3/N 3 10023, HIND TOTALLY, NQ 1001S, HW C			ORIENTATION : Vertical
WATER	LEVELS: 4.7	2 ft b	gs on 3	3/12/07 START: 3/11/2007 END: 3/3	20/20	07 LOGGER : C. LeBlanc, M. Faurot	e
	_			DISCONTINUITIES	ניז	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	DOCK TYPE COLOR	
Ä N N N	N. A. Y.		FRACTURES PER FOOT	BEGGIAII HOIV	으	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
ATI	E E E	(%) <sub>Q</sub>	ĮΣŏ	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	፬	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FRE	N S S S S S S S S S S S S S S S S S S S	οD	AC R F	PLANARITY, INFILLING MATERIAL AND	Æ	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	822	ď	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Š	CHARACTERISTICS	BROLO, TEOLINEOGETO, ETO.
	5 ft	53	4	152.7' - Bedding plane, horizontal, rough,		Limestone	SC-1 collected at 158.95-
-	84%			planar, grayish orange (10YR 7/4) stains on	<b>↓</b> _	<ul> <li>156.5-160.7' - yellowish gray to light</li> </ul>	159.9' -
160_				25% of surface	┸	olive gray, (5Y 7/2 to 5Y 5/2), olive	
-117.6			4	153.0' - Fracture, 75-80 deg, rough,	$\vdash$	gray (5y 3/2) mottling at 157.3', fine	
-				undulating, black stain over 10-15% of		- grained, moderate HCl reaction,	R5: 47 minutes
I -			NR	surface	┵	weak to medium strong (R2 to R3),	-
	161.5		INIX	153.2, 153.3, 153.4, 153.55, 153.7' - Bedding plane (5), horizontal, rough, planar, open <	$\vdash$	3/8" voids on 15% of surface (40-45% at 158.0-159.0'), casts over	!
				1/16"	1	45% of surface, trace cavities	<b> </b>
-			2	153.7-153.95' - Fracture zone, fragments		(3/16-1/8"), voids and cavities have	-
_				<3/4"	<b>-</b>	- an elongated subhorizontal	_
				153.95, 154.1, 154.3, 154.4, 154.6' -	$\vdash$	alignment, cavities concentrated	
1 -			1	Bedding plane (5), 5-10 deg, tight, brownish	L	from 156.5 -157.0' and 160.0-160.5'	1
-	R6-NQ			black staining on surface	匚	<ul> <li>No Recovery 160.7-161.5'</li> </ul>	-
1 _	5 ft	27	5	154.9' - Fracture, 80 deg, rough, undulating,	₽	Limestone	_
1	73%			tight, 5-10% staining as black speckles 155.2, 155.25' - Bedding plane (2),	$\Box$	161.5-165.2' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine	
105				horizontal, rough, planar, tight	匚	grained, moderate to strong HCl	· -
165			3	155.4' - Bedding plane or mechanical break,	$\vdash$	reaction, weak to medium strong (R2	
-122.6				30-40 deg, rough, undulating, open 1/4"	$\vdash$	to R3), fossiliferous (casts/molds,	
			NR	156.6' - Mechanical break, horizontal, rough,		1/16" and smaller), 30% voids	R6: 35 minutes
-			INIX	open 1/16"		(1/16"), 5-10% elongated cavities	-
_	166.5			156.8' - Fracture, 60-70 deg, rough,	₩	_ (3/16-1/16"), massive/homogeneous	_
			>10	undulating, tight		fine grained appearance 164.0-164.7'	
			/10	157.6' - Bedding plane, 30 deg, rough,		No Recovery 165.2-166.5'	_
-				undulating, tight 157.85' - Bedding plane, horizontal, rough,	Ь.	Limestone 166.5-169.0' - yellowish gray, (5Y	SC-2 collected at 167.55-
_			3	planar, tight	₽	7/2), fine grained, moderate HCl	168.25'
				158.5, 158.7, 158.8' - Bedding plane (3),	$\vdash$	reaction, 35-40% small (1/16") voids	Significant circulation loss
_	R7-NQ		1	horizontal, rough, planar, tight		concentrated at 166.5-167.3,	
-	5 ft	22	-	158.95' - Bedding plane, 15-20 deg, rough,	╙	<ul> <li>moderately fossiliferous (molds up to</li> </ul>	-
I _	50%			undulating, tight	┢┰	_ 3/8" x 1-3/8")	_
170				159.9' - Bedding plane, horizontal, rough,		No Recovery 169.0-171.5'	
-127.6			NR	planar, open 1/16" —	ш		
-				160.0, 160.4, 160.5' - Bedding plane (3), horizontal, rough, undulating, tight	+	-	R7: 26 minutes
1 _				161.7' - Fracture, 80 deg, rough, undulating,	Ľ	_	_
1	171.5			tight			End drilling for day
1 7	-			161.9' - Bedding plane, horizontal, rough,	⊣	Limestone	(3/14/07) at 171.5' – Water level at 4.52' below
-			>10	undulating, open 1/4"	╀	<ul> <li>171.5-175.4' - light brown to</li> </ul>	top of casing 3/15/07
1 _				163.2' - Fracture, 60 deg, rough, undulating,		yellowish gray, (5YR 6/4 to 5Y 7/2),	Advanced HW casing to -
1			ا م ا	tight	$\vdash$	fine to medium grained, mild to	168' on 3/15/07
1 -			>10	163.5, 163.6' - Bedding plane (2), horizontal, rough, undulating, open 1/16"	╙	- moderate HCl reaction, medium	Water level is at top of
-	Do NO			163.8, 163.95' - Bedding plane (2),	仜	strong to strong (R3 to R4), laminated bedding 172.6-173.1' with	casing when drilling -
1 _	R8-NQ 5 ft	22	2	horizontal, rough, undulating, 1/16" open	$\vdash$	- alternating beds of very dark and	resumed 3/20/07
	78%	~~		164.2' - Fracture, 65-75 deg, rough,	$\vdash$	light crystallized materials (pyrite and	
1 475				undulating, open 1/16", stains on 25% of	T	hematite), very fossiliferous (35%	<u> </u>
175 <u></u> -132.6			3	surface	匚	<ul> <li>void spaces from fossil molds) from</li> </ul>	<b> </b>
-132.0				164.6' - Fracture, 5-10 deg, rough,	$\vdash$	173.1-175.4'	
1 7			,,_	undulating, 1/4" open	$\vdash$	No Recovery 175.4-176.5'	R8: 129 minutes
-			NR	164.75-164.9' - Fracture zone, angular rock fragments	Ľ	-	-
-	176.5			165.15' - Mechanical break, horizontal,	Ш	Limantana	-
1			10	rough, undulating, tight	$\vdash$	Limestone - 176.5-176.8' - medium grained, mild	
1 7			'0	166.6' - Mechanical break, horizontal, rough,	<b>L</b> '	HCl reaction, medium strong (R3),	Ī
-				undulating, tight	仜	35-40% fossil related void spaces	-
1 -			6	167.1-167.25 - Fracture zone, rock	┢	-	-
				fragments	$\vdash$		
1 7	R9-NQ			167.4' - Mechanical break, horizontal, rough,			1
				undulating, tight	┨		-
1					1		
					1		



PROJECT NUMBER: BORING NUMBER: 338884.FL

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

00111110	J INIL ITTOD 7 II	ID LC	ZOII IV	TENT . CIVIE 33 3/N 3 10023, Mud Totally, NQ 10015, HW	asiriy		ORIENTATION . Vertical
<u>WATE</u> R	LEVELS: 4.7	'2 ft b	gs on	3/12/07 START: 3/11/2007 END: 3	<u>/20/2</u> 0	07 LOGGER : C. LeBlanc, M. Fauro	te
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		(0	DESCRIPTION	SYMBOLIC LOG		
NE E	ĭ,A,Ž	_	FRACTURES PER FOOT	DESCRIPTION	J	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
# # # # # # # # # # # # # # # # # # #	목 독교	(%) Q	28	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	٦	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
₽₽₩	#58 858	ο	AC.	PLANARITY, INFILLING MATERIAL AND	₩	AND ROCK MASS	SMOOTHNESS, CAVING ROD
SU	855	8	F.E.	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SY	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	5 ft	0	>10	167.5' - Fracture, 25 deg, rough, undulating,	+	176.8-177.35' - yellowish gray, (5Y	Faurote start logging at
_	78%			tight		- 7/2), very fine grained, moderate HCl	179' to the end of borehole –
180			>10	168.2' - Fracture, 30 deg, rough, undulating,	ш	reaction, medium strong to strong	
-137.6			/10	tight	┺	(R3 to R4), thin to laminar bedded	
-				168.45' - Fracture, 80 deg, rough, undulating,	+-	<ul> <li>177.35-180.4' - moderate yellowish</li> </ul>	R9: 67 minutes
l _			NR	black stains on 15% of surface	$\perp$	brown, (10YR 5/4), fine to very fine	- To. or minutes
	181.5			168.65' - Fracture, 20 deg, rough, undulating	<b>—</b>	grained, moderate to strong HCl	
-	101.0			171.6' - Fracture, 45 deg, rough	╨	- reaction, indistinctly bedded and	1
-			0	171.75-172.3' - Fracture zone, multiple small fragments	╁┰	presents about 25% void space due to fossil casts and molds	-
				172.55, 172.75, 172.8' - Bedding plane (3),		- No Recovery 180.4-181.5'	
				smooth, planar	$\perp$	Limestone	
-			5	172.8-172.95' - Fracture, rough, "L" shaped	+	181.5-183.5' - light brown, (5YR 6/4),	1
-				fracture	亡	<ul> <li>very fine grained, mild HCl reaction,</li> </ul>	-
1	R10-NQ	20		172.95-173.6' - Fracture zone or mechanical	Щ	medium strong (R3), 25% void space	
I -	5 ft 40%	20		break	$\vdash$	from fossil molds and casts	1
-	40/0			173.85' - Mechanical break, rough,	+-	No Recovery 183.5-186.5'	1
185			NR	undulating, irregular, no fill 174.0' - Fracture, rough	$oldsymbol{oldsymbol{oldsymbol{\Box}}}$		
-142.6				174.0 - Fracture, rough 174.25' - Fracture or mechanical break,	$\vdash$		
-	1			horizontal	┰┷	=	R10: 23 minutes
-				174.5-175.35' - Fracture zone, multiple	╁┰	-	-
_	186.5			breaks		<del>-</del>	l <u> </u>
				176.45-177.45' - Fracture zone, horizontal,		Limestone	
-			>10	rough to smooth, undulating, multiple	$\top$	<ul> <li>186.5-188.1' - light brown, (5YR 5/6), very fine grained, mild HCl reaction,</li> </ul>	1
-				fractures, most appear horizontal	-	medium strong to strong (R3 to R4),	
l _			9	177.45-178.45' - Fracture zone, mostly horizontal fractures, mechanical breaks that	$\bot$	exhibits fossil related voids to 35% of	]
				look like shatter cones at 177.80'	$\vdash$	the visible rock	
-	R11-NQ			178.45-179.5' - Fracture zone or mechanical		188.1-188.5' - moderate yellowish	1
-	5 ft	0		break	╨	<ul> <li>brown, (10YR 5/4), very fine grained,</li> </ul>	-
l _	68%		>10	179.5-180.35' - Fracture zone, 2 flat surfaces	ᅪ	mild HCl reaction, medium strong to	]
190				and a broken zone		strong (R3 to R4), thinly to laminar	
-147.6				182.45' - Mechanical break, rough	$\perp$	— bedded or pseudo bedded 188.5-189.9' - pale yellowish brown,	Lost circulation from 189'
-				182.75-183.05' - Fracture, 80 deg, vertical fracture, not separated, and does not extend	+	(10YR 6/2), mild HCl reaction, weak	to 195'
l _			NR	beyond this piece	$\bot$	to medium strong (R2 to R3), highly	R11: 35 minutes
	191.5			183.0-183.35' - Fracture zone, multiple		fossiliferous with large echinoderm	
I -	.51.0			smooth, planar faces	╁	and gastropod casts, total void space	1
-			>10	186.5' - Fracture zone, multiple broken	╁┼	<ul> <li>about 30%, organic traces along</li> </ul>	-
1 _				fragments smaller than 1.5", no defined	Т	some fossil casts	]
			_	feature		No Recovery 189.9-191.5'	1
1 -			6	187.75-188.35' - Fracture, vertical, rough,	╁	Limestone 191.5-191.8' - Same as 188.5-189.9'	1
-	B 42 11 2			undulating 188.35' - Fracture, rough, planar, iron	+	191.5-191.6 - Same as 166.5-169.9	-
	R12-NQ		>10		广	_ 7/2), very fine grained, mild HCl	]
1	5 ft 72%	7	/10	188.40' - Fracture, healed	$\vdash$	reaction, laminar bedded	1
	12/0			188.65-188.95' - Fracture, vertical, exhibits	+	192.1-193.5' - mild HCl reaction,	
195_			3	very heavy solution erosion features and		medium strong (R3), highly	-
-152.6				infilling or plating of iron oxides creating a	$oldsymbol{\perp}$	fossiliferous exhibiting 30% void	
I -			NR	very rough surface	$\vdash$	spaces from casts and molds, and numerous shell fragments, apparent	Void at 195.5'
I -				191.5-191.9' - Fracture zone, numerous	世	clasts of fine grained rock are visible	R12: 78 minutes
-	196.5			small rock fragments 191.7' - Fracture, smooth, planar	$\perp$	within the fossil rich rock, solution	-
1			<b>~</b> 40	191.7 - Fracture, Smooth, planar 191.9' - Fracture, slightly rough, planar, iron	$\vdash$	cavities with iron oxide minerals or	
I -			>10	oxide stains	╁	stains	The rock presents an
1 -				192.15' - Fracture, 0-7 deg, rough, staining or	$\perp$	<ul> <li>193.5-195.1' - Same as 191.8-192.1'</li> </ul>	overall picture of
I -	D40 NO		4	minerals on fracture faces	+	No Recovery 195.1-196.5'	subsidence or collapse and
1	R13-NQ 3.8 ft			192.55' - Fracture, 60 deg, rough,	$\vdash$	Limestone	reinduration due to the size, shape, and orientation
I -	61%	5	1	recrystallization on the face that is very rough	T	- 196.5-197.0' - Same as 191.8-192.1'	of some of the fragments
					-	_	5. Some of the magnitude
1							
	. '						



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723168.5 N, 458055.6 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

					sirig		
WATER	LEVELS: 4.7	72 ft b	gs on 3	3/12/07 START : 3/11/2007 END : 3/2	0/20	07 LOGGER: C. LeBlanc, M. Faurot	e
				DISCONTINUITIES	(5)	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		တ္က	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표 지 N	N. A.Y.	(9)	FRACTURES PER FOOT	BEGGIAI HOIT	2	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
E E E E	# E S	Q D (%)	ĬĔĞ	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOL	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	RNN	g	ER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ООШ	07%	ď	⊡∟		S		
			1]	192.55-193.4' - Fracture, 10-80 deg, multiple	Щ	197.0-198.1' - moderate yellowish	R13: 4 minutes
200			NR	fractures with crystallization of iron - compounds and organics	П	brown to light brown, (10YR 5/4 to 5YR 6/4), mild HCl reaction, medium	Shows interrupted bedded - and differential
-157.6	200.3			193.4-195.0' - Mechanical break, multiple		strong to strong (R3 to R4), solution	compaction, plus a variety
-	200.0			breaks		channels along fracture plans	of clasts types in less than
				195.0' - Fracture, 45 deg, recrystallized		198.1-198.4' - light brown, (5YR 5/6),	1/4" sizes. At 198.4' there
	1			carbonate microcrystalline masses		thin to laminar bedded in regular	is an undulant contact that
-	1			196.45-197.1' - Fracture zone, numerous		- planes with silt and sand-sized grains	looks like shallow ripple
-				small rock fragments, one fragment shows intersecting 45 deg fractures with deposit of		in varying proportions 198.4-198.8' - pale yellowish brown,	marks of low amplitude May exhibit healed
_				recrystallized minerals		- (10YR 6/2), moderate HCl reaction,	subsidence features
				197.05-198.1' - Fracture, 65-80 deg, rough,		weak to medium strong (R2 to R3),	TD=200.3' at 17:48 on
				irregular edged joint exhibiting dark stains,		fossil void spaces about 30%	3/20/07
-	1			the surface shows recrystallized minerals		No Recovery 198.8-200.3	Water level at 3' below
-				including iron oxides 198.4' - Fracture, horizontal, planar, iron		Bottom of Boring at 200.3 ft bgs on	ground surface on 3/21/07
I -				oxide minerals and some (2-5%) fine		3/20/2007 -	] _
				grained, silt sized infilling `			
1 -	1			198.7' - Fracture, 65 deg, rough, angular		_	_
-	-			faces with some silt sized infilling		-	-
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723171.1 N, 458054.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 4.72 ft k	ngs on 3/1	12/07	START : 5/22/2007 END : 5/23/2007	LOGGE	R : R.	Gomez
300				STANDARD	SOIL DESCRIPTION		g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, CO	OLOB	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSI	TY OR	BOLI	DRILLING FLUID LOSS, TESTS, AND
SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINER	RALOGY	SYM	INSTRUMENTATION
42.8	0.0				Fill	was sal mais	$\otimes$	
		0.4	SS-1	4-5-6 (11)	0.0-0.4' - limestone, derived silt, sand and g	ravei mix	]	Water level is based on Ground Water Monitoring at LNP site (FSAR Table
	1.5						1	2.4.12.08)
_							1	A-21A drilled in construction road; road material is silty sand with gravel limestone –
-	-						-	derived product Relogged by J. Schaeffer and T. Stewart
-	1						┨	Water levels not recorded during drilling
-	1						┨	-
-	1						┨	-
5	5.0					•	1	-
37.8	0.0				Clayey Sand (SC)			_
		0.8	SS-2	1-1-2 (3)	5.0-5.75' - light bluish gray with light brown s	rv fine to $\Gamma$	<i>\///</i>	
	6.5			(0)	fine grained, no HCl reaction, 20% medium plasticity fines, sand is silica	to high		
_					plasticity inies, said is sinca		1	_
-	-						1	_
-							1	-
-	1						1	-
-	1						┨	-
10	10.0						1	-
32.8	10.0				Silt (ML)		Ш	
		1.3	SS-3	12-11-15 (26)	10.0-11.3' - grayish orange, (10YR 7/4), wet nonplastic, very rapid dilatancy, mild to mod	lerate HCl		
	11.5			(=0)	reaction, 5-10% very fine to fine sand-sized carbonate	, all	Ш	_
_					Carbonato		1	_
-	-						1	-
-	1						┨	-
-	1						ł	-
-	1						1	-
15	15.0						1	-
27.8	10.0	0.6	SS-4	21-50/3	Silt With Limestone (ML)	+	Ш	
	15.8			(71/9")	15.0-15.6' - Same as 10.0-11.3' except scat lenses of coarse sand- to fine gravel-sized l	imestone	Ш	_
_					\fragments, all carbonate		1	_
-	1						1	_
-	-						-	-
-	-						1	-
-	1						1	-
-	1						1	-
20	1					-	1	-
							1	



PROJECT NUMBER:	BORING NUMBER:
338884.FL	A-21A

SHEET 2 OF 8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723171.1 N, 458054.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 4.72 ft k	ogs on 3/1	12/07	START : 5/22/2007 END : 5/23/2007 LC	OGGER	: R.	Gomez
				STANDARD	SOIL DESCRIPTION		G	COMMENTS
AND N (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	Y	SYM	INSTRUMENTATION
22.8	20.0				Silty Sand (SM)		Ш	
		1.5	SS-5	19-16-15 (31)	20.0-21.5 - grayish orange to dark yellowish orang (10YR 7/4 to 10YR 6/6), wet, dense, fine to coarse	je, –		
	21.5			(0.)	grained, mild to moderate HCl reaction, 30% nonplastic fines, all carbonate derived			
_					Trompiastic files, all carbonate derived			_
-						-		-
-						-		-
-						-		-
-						-		-
25	25.0					-		-
17.8	20.0				Sandy Silt (ML)		Ш	
		1.4	SS-6	23-22-26 (48)	25.0-26.4' - grayish orange to dark yellowish orang (10YR 7/4 to 10YR 6/6), wet, hard, nonplastic, 41%	je, – ,,		
	26.5			(10)	fine to medium grained sand		Ш	_
-						_		-
-						-		-
-						-		-
-						-		-
-						-		-
30	30.0					-		-
12.8		4.4	SS-7	4-20-50/1	Silty Sand (SM) 30.0-31.1' - Same as 25.0-26.4' except very dense.			
_	31.1	1.1	55-7	(70/7")	25-30% nonplastic fines	, –		_
-						-		-
-						-		-
-						-		-
-						-		Heavy grinding and chattering; 10 minutes to
-						-		drill 33.0-35.0' -
-								-
35	35.0	0.0	\ SS-8 /	50/1	No Recovery 35.0-35.1'	-		Set HW casing to 35' and switch to rock
7.8	35.1	0.0	\ 33-6 /	(50/1")	Begin Rock Coring at 35.0 ft bgs	_/		coring; see rock core log End of drilling for the day, 5/22/07
-					See the next sheet for the rock core log	-		
-						-		-
-						-		-
-						-		-
-						1		-
						]		
-								<u>-</u>
40								



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SHEET 3 OF 8

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723171.1 N, 458054.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 4.7	'2 ft bo	gs on :	3/12/07 START : 5/22/2007 END : 5/	23/20	07 LOGGER : R. Gomez	
>00	(9			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIO	TH./	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ğ	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT URF	ORE	Ø	ZAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
		22	H H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś		, ,
7.8	35.0		1	_	H	Limestone - 35.0-38.6' - pale yellowish brown,	Begin rock coring at 08:17, 5/23/07
_			·	35.6' - Bedding plane, 0-30 deg, rough,	$\perp$	(10YR 6/2), moderate to strong HCl	
			1	planar, tight	Д	reaction, very weak (R1), thin bedding, moderately fossiliferous	
			'	36.8' - Bedding plane, 5-10 deg, rough,		(casts/molds), sample is 20-30%	
	R1-HQ	50	4	undulating, tight to open (1/8")	$\vdash$	voids/casts <1/8", trace irregular shaped cavities 1/4"x1/8", trace	
	5 ft 72%	50	4	37.7' - Fracture, 50 deg, rough, undulating		coarse grain organic fragments,	
			2	37.85, 37.95,' - Bedding plane (2), horizontal,	H	carbonate silt lenses present at 37.9-38.1'	1
				wavy bedding plane contacts with carbonate fines	$\perp$	No Recovery 38.6-40.0'	Ī
_			NR	38.5' - Mechanical break	ш	-	R1: 5 minutes
40	40.0				┢	+	1
2.8	70.0			_	F	 Limestone	-
-			2	40.3, 40.4' - Mechanical break (2), horizontal, rough, undulating, tight		<ul> <li>40.0-43.0' - pale yellowish brown, (10YR 6/2), fine to medium grained,</li> </ul>	-
_				41.0, 41.1' - Mechanical break (2), horizontal,	₩	moderate to strong HCl reaction,	1
-			4	rough, undulating, tight 41.6, 41.8' - Bedding plane (2), horizontal,	╨	<ul> <li>extremely weak to very weak (R0 to R1), 3-5% fine grain moderately dark</li> </ul>	-
_	R2-HQ			rough, undulating, tight	士	gray (N4) particles in matrix, 5-7%	-
-	5 ft	23	4	42.15' - Fracture, 40 deg, smooth, planar,	+	<ul> <li>coarse grain black particles,</li> </ul>	-
_	60%			tight 42.2, 42.5, 42.9' - Mechanical break (3), <5	H	moderately fossiliferous (casts/molds), fossils (up to 3/8"),	-
_				deg, rough, undulating, tight	H	- 15-25% voids/casts (<1/16")	-
_			NR		₽	No Recovery 43.0-45.0'	R2: 3 minutes
_					$\perp$	-	RZ. 3 minutes
45 -2.2	45.0			45.0.46.4' Machanical brook, multiple	Ł	Limestone	_
			>10	45.0-46.4' - Mechanical break, multiple irregular breaks		- 45.0-48.9' - dark yellowish brown,	-
_					╁	(10YR 4/2), extremely weak to very	-
_			>10			weak (R0 to R1), 3-7% black organic lamination (<1/16") and coarse grain	_
_				<u>.</u>	L	particles, 25-35% spheroidal voids	_
_	R3-HQ 5 ft	15	6	47.2, 47.4, 47.6, 47.8, 48.4, 48.8, 48.9' -	₽	(<1/8"), moderately fossiliferous (casts and molds), most fossils	_
_	78%			Mechanical break (7), horizontal, rough, undulating, tight	ш	<1/8", trace dissolution cavities	
_			3	undulating, tight		across the entire run	
					$\vdash$	- No Booyen, 49 0 50 0	
			NR		广	No Recovery 48.9-50.0'	R3: 2 minutes
	50.0				片		
-7.2			>10	50.0-50.3' - Fracture zone, subangular rock fragments 1/2"-1-1/8" in size	H	Limestone 50.0-54.2' - dark yellowish brown,	
			/10	50.0, 50.1, 50.3, 50.45' - Bedding plane (4),		(10YR 4/2), very fine to fine grained,	1
			5	5-10 deg, rough, undulating, open (1/16"), occuring on organic laminations		moderate HCl reaction, very weak to	1
			ن	50.6, 50.7' - Bedding plane (2), 5-10 deg,	Ь	<ul> <li>weak (R1 to R2), 15-20% spheroidal and elongated voids &lt;1/8", 5-10%</li> </ul>	1
]	R4-HQ	00		rough, undulating, open (1/16")	$\vdash$	elongated dissolution cavities	1
]	5 ft 84%	28	2	51.7' - Bedding plane, horizontal, rough, undulating, open (1/8")	Ħ	<ul> <li>unfilled, both elongated voids and cavities appear to be sub horizontally</li> </ul>	1
]				52.1, 52.65, 53.0, 53.15' - Bedding plane (4),	世	aligned, 3-5% organic material as	1
			3	15-20 deg, rough, undulating, tight 53.25' - Bedding plane, 30 deg, rough,	⊬	<ul> <li>coarse black particles and laminations at 51.3' and 52.3'</li> </ul>	1
			0	undulating, organics on upper surface		No Recovery 54.2-55.0'	R4: 5 minutes
55 -	55.0		NR	•	世	_ 110 Necovery 04.2-00.0	1
	55.0			_	1	_	



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723171.1 N, 458054.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 4.7	2 ft b	gs on 3	3/12/07 START : 5/22/2007 END : 5/	23/200	7 LOGGER : R. Gomez			
>∩≎	. (%			DISCONTINUITIES	ပ္မ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
H B	E.R.L.	(%) <sub>Q</sub>	T S S	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD		
E SUST	SECC	RO	'RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS		AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.		
-12.2	0716	Ľ	шш		0)	Limestone			
			>10	55.2-55.45' - Fracture zone, 1/4" to 1-1/2" rock fragments	$\Box$	- 55.0-58.9' - pale yellowish brown with	-		
-				55.65' - Bedding plane, 2-5 deg, rough,	世	trace olive gray mottling, (10YR 6/2 with 5Y 4/1), very fine to fine grained,	-		
-			3	planar, open (<1/16") 55.95' - Bedding plane, 5 deg, rough,	₩	- moderate to strong HCl reaction,	_		
-	DE 110			stepped, open (<1/16")	Ш	weak to medium strong (R2 to R3), 10-15% voids (<1/16"), elongated,	_		
_	R5-HQ 5 ft	47	4	56.1, 56.3' - Mechanical break		- poorly fossiliferous (casts), fossils	-		
_	78%			56.5' - Fracture, 60 deg, rough, undulating, open (<1/8")	$\vdash$	are <1/16", 3-7% medium grained	SC-1 collected at 57.5- 58.9'		
_			1	57.3' - Fracture, 50 deg, rough, undulating,		<ul> <li>angular shaped black particles, trace</li> <li>short (&lt;1/16") discontinuous black</li> </ul>	_		
_				open (<1/8") 57.4' - Bedding plane or mechanical break	$\vdash$	laminations grading from weak rock	_		
			NR	57.5' - Bedding plane, horizontal, rough,	Ш	(R2) at top to medium strong rock (R3) at the bottom	R5: 7 minutes		
	60.0			stepped, 3/8" relief on surface 58.9' - Bedding plane or mechanical break, —	Ш	No Recovery 58.9-60.0'			
-17.2			1	horizontal, rough, planar, open (< 1/16")		Limestone			
			ļ	60.3' - Bedding plane, horizontal, rough,	$\vdash$	<ul> <li>60.0-61.2' - pale yellowish brown to moderate yellowish brown, (10YR 6/2</li> </ul>			
				undulating, open (1/2") 61.2, 61.4' - Bedding plane or mechanical		to 10YR 5/4), moderate to strong HCI	_		
-			2	break (2), 5-10 deg, rough, undulating, open	Ш	<ul> <li>reaction, medium strong (R3), 3-5% voids &lt;1/16", 5-10% horizontally</li> </ul>	_		
	R6-HQ			(3/4") 62.0' - Bedding plane, horizontal, rough,	╁	aligned <3/8" flat black flakes	_		
_	5 ft 92%	35	3	undulating, open (1/8")	ш	<ul> <li>61.2-61.4' - Same as 60.0-61.2' except weak (R2), 25-35% voids</li> </ul>	-		
_	02,0			62.3' - Bedding plane, 5-10 deg, rough, undulating, tight		<1/16", 5-10% coarse grain black	-		
_			4	62.5' - Mechanical break	$\vdash$	<ul> <li>particles</li> <li>61.4-62.0' - Same as 60.0-61.2'</li> </ul>	-		
-			0	62.8, 63.05, 63.3, 63.5, 63.8' - Bedding plane		62.0-64.6' - Same as 61.2-61.4'	R6: 6 minutes		
-	05.0		NR	or mechanical break (5), horizontal, rough, undulating, open (<1/16")		- No Recovery 64.6-65.0'	-		
65 <u> </u>	65.0		INF	_	₩	Limestone	_		
_			>10	GE G GE 70! Fracture zone rock fragmente	ш	- 65.0-71.0' - mottled pale yellowish	-		
_				65.6-65.78' - Fracture zone, rock fragments		brown and dark yellowish brown, (10YR 6/2 and 10YR 4/2), fine	SC-2 collected at 65.78-		
-			0		+	grained, moderate to strong HCl	66.77'		
_	R7-HQ				$\vdash$	reaction, weak to medium strong (R2 to R3), 10-15% voids <1/16", voids	-		
_	5 ft	68	1	67.2' - Bedding plane, horizontal, rough, undulating	廿	<ul> <li>restricted to pale yellowish brown</li> </ul>	-		
_	100%			undulating	╀┼	color, 3-7% medium grain black flakes present as short discontinuous	-		
-			0		$\Box$	<ul> <li>laminations across rock sample, very</li> </ul>	_		
-				69.0' - Bedding plane, horizontal, rough,	ш	thinly bedded at 69.0-69.3', mottled areas appear to be bioturbated zones	R7: 10 minutes		
-			4	planar, 1/16" silt and/or clay sized infilling	$\Box$	oriented subhorizontally	- IV IIIIIIules		
70 <u> </u>	70.0			69.3' - Bedding plane, horizontal, rough,	+		-		
-21.2			2	planar, tight medium grained black flakes on surface	H	_	-		
-				69.6' - Fracture, 20-30 deg, smooth, stepped,		74.0.74.41	_		
_			2	1-3/4" fossil on fracture surface 69.8' - Fracture, 80 deg, rough, planar, tight	igspace	71.0-74.4' - pale yellowish brown, - (10YR 6/2), fine grained, moderate to			
_				70.68' - Bedding plane, 10-15 deg, rough,	Щ	strong HCl reaction, 20-30%	]		
_	R8-HQ 5 ft	60	1	undulating, at top of extremely weak rock 70.8' - Bedding plane, 5-10 deg, rough,	Ш	voids/casts <1/16", moderately fossiliferous with casts (up to 1/2"),			
	88%	00	'	undulating, top of fractured rock	$\vdash$	5-10% medium to coarse grain black			
			1	71.0' - Bedding plane, <5 deg, rough, undulating, base of fractured zone	H	particles, 3-5% medium to coarse grained dark gray angular to			
			L' l	71.3' - Fracture, 80 deg, rough, undulating,	$\vdash$	subangular shaped particles, 1/2"	]		
			1	tight, fracture up to 7" long 72.7' - Bedding plane, 5-10 deg, rough,	Ш	thick organic layer at 73.6', below 73.6' rock looks more weathered	R8: 7 minutes		
75	75.0		NR	undulating, tight	П	than above	1		



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723171.1 N, 458054.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 4.7	2 ft bo	s on 3	3/12/07 START : 5/22/2007 END : 5/	23/200	D7 LOGGER : R. Gomez					
≥□₽	(%			DISCONTINUITIES	၂ ၂	LITHOLOGY	COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS TEST RESULTS ETC				
-32.2 - - - - - - -	R9-HQ 5 ft 96%	40	0 1 1 >10 NR >10 NR 3	THICKNESS, SURFACE STAINING, AND TIGHTNESS  73.6' - Bedding plane, 0-5 deg, rough, undulating, 1/2" thick organic layer 73.8' - Mechanical break, 30 deg, rough, undulating, tight 74.1' - Bedding plane or mechanical break, horizontal, rough, undulating, tight 76.6' - Fracture, 30 deg, rough, undulating, tight 76.6-77.1' - Fracture, vertical, rough, undulating, black staining on 15% of surface, multiple intersecting mechanical breaks 77.6-78.6' - Fracture zone, high angle fractures through an interval of apparently weathered rock 78.6, 78.8' - Bedding plane (2), horizontal, rough, undulating, top and base of organic-rich carbonate fines layer 80.0-80.3' - Fracture zone, rock fragments 80.6' - Bedding plane or mechanical break, horizontal 81.0' - Fracture, 65-75 deg, rough, undulating		CHARACTERISTICS  No Recovery 74.4-75.0' Limestone 75.0-78.6' - moderate yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), moderate HCl reaction, weak (R2), 25-30% voids <1/16", trace unfilled cavities 1"x1/2" (mostly near bottom), moderately fossiliferous (casts), 3-7% fine to medium grained black particles; 1-1/2" thick organic lense 78.6-79.8' - Same as 75.0-78.6' except very weak (R1)  No Recovery 79.8-80.0' Limestone 80.0-84.4' - pale yellowish brown, (10YR 6/2), moderate to strong HCl reaction, weak (R2), moderately fossiliferous (cast/molds), 3-7% medium to coarse grain black	PROPS, TEST RESULTS, ETC.				
- - - - - 85	R10-HQ 5 ft i 88%	10	2 2 1 NR	81.3' - Fracture, 30 deg, rough, undulating, tight 81.7' - Fracture, 40 deg, rough, undulating, tight 82.1' - Fracture, 30 deg, rough, undulating, top of zone of fragmented rock 82.7' - Fracture, 70-80 deg, rough, undulating, tight 83.1' - Fracture, 70 deg, rough, undulating,		medium to coarse grain black     particles, fossils (up to 5/8"), various     fossil types present including tubular     shaped organisms, top 0.4' of run     appears weathered  No Recovery 84.4-85.0'	R10: 10 minutes				
-42.2     	R11-HQ 5 ft 1 46%	15	0 NR	tight 83.2' - Fracture, horizontal, rough, undulating 83.8-84.3' - Fracture zone 84.3' - Fracture, 30-40 deg, rough, undulating, base of fractured zone 85.9' - Fracture, 30 deg, rough, undulating, infilling on surface		Limestone  85.0-85.9' - pale yellowish brown, (10YR 6/2), strong HCI reaction, strong (R4), 5-10% void <1/16",  10-20% unfilled cavities irregularly shaped up to 1" in size, some are dissolution cavities, moderately fossiliferous (casts/molds), fossils up to 5/8" in size, intervals of weathering/dissolution cavities of fragmented core, subrounded to	SC-3 collected at 85.0- 85.82' - - Circulation loss at 87.0' Core loss assumed to occur from 85.9-88.6'				
	90.0		>10 >10	88.5-89.6' - Fracture zone, fragments from 3/8" to 1", staining on few surfaces, possibly weathered rock, possible dissolution cavity  89.7' - Fracture, 60 deg, rough, undulating,		subangular in shape, brownish black staining on some fragments, stained dark yellowish brown over bottom 0.4'	R11: 6 minutes				
-47. <u>2</u> - - -			10	open (<1/16") 90.3-91.0' - Fracture zone, 1/2"-2" rock fragments 91.1' - Fracture, 40-50 deg, rough, undulating, open (2") 91.5' - Fracture, 70 deg, rough, undulating,		No Recovery 85.9-88.6'  Limestone 88.6-90.0' - Same as 85.0-85.9' 90.0-91.5' - moderate yellowish brown with 40% mottled with very pale orange, (10YR 5/4 with 10YR	- - -				
- - - - -	R12-HQ 5 ft i 94%	52	52				1 4 1	91.5 - Fracture, 70 deg, rough, undulating, open (1/16")  92.7' - Fracture, 5-10 deg, rough, undulating, open (<1/16")  93.0, 93.1' - Fracture (2), 30 deg, rough, undulating, tight  93.3' - Fracture, 50 deg, rough, undulating, tight		8/2), moderately fossiliferous (cast/molds), fossils (mostly <1/4" but a few are up to 1/2"), 25-30% spheroidal voids (<1/16"), voids mostly restricted to the pale yellowish brown color areas	R12: 7 minutes
95	95.0		NR								



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723171.1 N, 458054.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 4.7	'2 ft bo	gs on (	3/12/07 START : 5/22/2007 END : 5/	23/20	7 LOGGER : R. Gomez	
≥O≎	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU STH, OVEF	(%)	T. 1	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
E EV	CORE	R Q D (%)	'RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3YME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-52.2	0716	IL.	шш	93.95, 94.3' - Bedding plane or mechanical	0)	91.5-94.7' - Same as 90.0-91.5'	004 11 4 4 05 40
-			0	break (2), 5-10 deg, rough, undulating, tight	H	<ul> <li>except pale yellowish brown,</li> </ul>	SC-4 collected at 95.13- 95.96'
_				95.0-95.2' - Fracture zone, zone of mechanical breaks	Ш	(10YR6/2), with brownish black rippled lamination at 94.5'	-
_			>10	96.0-97.6' - Fracture zone, 50-70 deg,	$\vdash$	- No Recovery 94.7-95.0'	_
_	540.110			fractures are intersected by potential mechanical breaks	Ш	Limestone 95.0-97.6' - moderate yellowish	_
_	R13-HQ 5 ft	15	>10	mechanical breaks		<ul><li>brown to pale yellowish brown,</li></ul>	_
_	52%				┵	(10YR 5/4 to 10YR 6/2), fine grained,	_
_						weak to medium strong (R2 to R3), 15-20% elongated voids <1/8" sub	_
			NR			horizontally oriented, moderately	
					Ш	fossiliferous with casts up to 3/8"  No Recovery 97.6-100.0'	R13: 4 minutes
100	100.0				Ш	- 110 Necovery 37.0-100.0	]
-57.2	,			100.0-100.2' - Fracture zone	Ы	Limestone	
			>10	100.5-100.75' - Fracture zone	H	<ul> <li>100.0-103.2' - pale yellowish brown, (10YR 6/2), fine grained, moderately</li> </ul>	1
_				100.9' - Fracture, 20 deg, rough, undulating,	Ш	fossiliferous with casts up to 5/8"	
-			>10	open (1/8") 101.4' - Fracture, 20 deg, rough, undulating,	₩	<ul> <li>weathered over top 0.7', color may be due to potential staining or</li> </ul>	-
-	R14-HQ			open (1/2")	T	weathering, 10-15% medium to	-
-	5 ft	18	0	101.6' - Fracture, 80 deg, rough, undulating, tight	$\pm$	<ul> <li>coarse grain black particles, trace</li> </ul>	-
-	64%		0	101.7' - Fracture, 0-10 deg, rough,	+	short (1/16") discontinuous black laminations throughout core run	-
-				undulating, tight 101.8' - Fracture, 15-20 deg, rough,	$\pm$	- No Recovery 103.2-105.0'	-
-			NR	undulating, top of fractured zone		-	R14: 3 minutes
-				102.0' - Fracture, 60 deg, rough, undulating, base of fractured zone	Ш	_	1714. 5 minutes
105 <u> </u>	105.0			_	$\perp$	Limestone	_
-02.2			2	105.1' - Bedding plane or mechanical break, horizontal, rough, undulating, open (1/8")	$-\Box$	- 105.0-109.5' - moderate yellowish	_
_				105.35' - Bedding plane or mechanical break,	$\bot$	brown with 15-20% dark yellowish	_
_			0	30 deg, rough, undulating, tight		brown mottling, (10YR 5/4 with 10YR - 4/2), fine grained, moderate HCl	_
_			_			reaction, weak (R2), 15-25% voids	_
	R15-HQ 5 ft	38	>10	107.35' - Fracture, horizontal, rough,	Щ	<1/16", poorly fossiliferous (molds), trace irregular shaped unfilled	
	90%	00	- 10	undulating, open	Ш	cavities up to 5/8"	
			9	107.35-107.55' - Fracture zone	Н		
			9	107.6-107.8' - Fracture, 60 deg, rough, undulating, open (1/4")			]
]			2	107.95-108.7' - Fracture, 80 deg, rough,			R15: 5 minutes
110	110.0		NR	undulating, open 108.2' - Fracture, horizontal, intersects one	$\mathbb{H}$	No Recovery 109.5-110.0'	
-67.2				fragment of fracture at 107.95-108.7'	Ш	Limestone	
			9	108.4' - Fracture, horizontal, rough, undulating, open, intersects one fragment of	ш	<ul> <li>110.0-112.5' - pale yellowish brown, (10YR 6/2), fine grained, moderate</li> </ul>	1
-				fracture at 107.95-108.7'	Н	HCl reaction, weak (R2), 5-10%	_
-			>10	108.8-109.0' - Fractures, 60 deg, rough, undulating, open	Ħ	<ul> <li>voids up to 1/8", trace cavities up to 3/4"x3/4" infilled with fine grained</li> </ul>	-
-	R16-HQ		>10	109.0-109.5' - Fracture, vertical, rough,	世	weak (R2) carbonate material	-
-	5 ft	0	- 10	undulating, open 109.5' - Fracture, 15 deg, rough, undulating,	╁┼	No Recovery 112.5-115.0'	-
-	50%			open	H	-	-
-			ND	110.15' - Fracture, horizontal, rough,	丗	_	-
-			NR	undulating, open 110.15-110.5' - Fracture, vertical, rough,	+	-	R16: 7 minutes
-				undulating, open, rock fragments on smaller		<u>-</u>	TO. / Illinutes
115	115.0			side of fracture	H		
							I .



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SHEET 7 OF 8

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723171.1 N, 458054.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 4.7	'2 ft b	gs on 3	3/12/07 START : 5/22/2007 END : 5/	23/200	7 LOGGER : R. Gomez			
≥∩≘	_ (%			DISCONTINUITIES	ဖွ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
A SE	E FE	(%) <sub>Q</sub>	NT.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	]	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND		
FPT.	NG CO	Oρ	RAC:	PLANARITY, INFILLING MATERIAL AND	Ŋ.	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
SUS	SHR	R (	FR	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥ	CHARACTERISTICS	BROFS, TEST RESOLTS, ETC.		
-72.2			. 40	111.0-111.5' - Fractures (2), 85 deg and	Ш	Limestone			
			>10	vertical, rough, undulating, open 111.4-111.65' - Fracture, 60 deg, rough,	Ш	- 115.0-118.0' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR	1		
-				undulating, open	H	6/2), fine to medium grained,	-		
-			2	111.65-112.0' - Fractures, 75 deg, rough,	世	- moderate to strong HCl reaction,	-		
-	D47.110			undulating, open 112.0-112.5' - Fracture zone	Ш	weak (R2), except very weak (R1) at 115.0-115.3', moderately	-		
_	R17-HQ 5 ft	18	4	115.0-115.15' - Fracture zone -	Ш	- fossiliferous, 25% coverage of very	_		
	60%		•	115.2, 115.35' - Fractures (2), <10 deg,	Н	small (<1/16") voids, 5-10% small	_		
				rough, undulating, open		(1/16"-3/16") voids, trace cavities up			
				115.65, 115.75' - Fractures (2), horizontal,	Ш	<ul> <li>to 1-3/16"x3/8", 50% of cavities infilled with carbonate material</li> </ul>			
-			NR	115.75-116.0' - Fracture zone	Ш	similar to 110.0-112.5', visible shell	R17: 4 minutes		
-				116.1-116.25' - Fracture, 45 deg, rough,	П	- fragments at 115.0-115.5', large	-		
120 <u> </u>	120.0			planar, tight 116.35' - Fracture, horizontal, rough,	냅	(about 50% of core by volume) cavity (not infilled) at 115.45-115.65'.			
-11.2			>10	undulating, open	Ш	strength of HCl reaction decreases	]		
				117.1' - Fracture, <10 deg, rough, undulating,	Ш	with depth	SC 5 collected at 120 99		
				open 117.5, 117.6, 117.65' - Fractures (3),	$\Box$	No Recovery 118.0-120.0' Limestone	SC-5 collected at 120.88- 121.71'		
			2	horizontal, rough, planar, open	Н	120.0-124.5' - grayish orange to pale	1 1		
-	R18-HQ			120.2' - Fracture, horizontal, rough,	Ш	yellowish brown, (10YR 7/4 to 10YR	-		
-	5 ft	57	1	undulating, open 120.25-120.6' - Fracture zone	H	6/2), fine grained, mild HCl reaction, weak (R2), except very weak (R1) at	-		
-	90%			120.25-120.6 - Fracture 2011e 120.85' - Fracture, horizontal, rough,	口	124.1-124.5', very small (<1/16")	-		
_			0	undulating, open	┞┤	voids, trace small (1/16"-1/8") voids,	_		
				121.75, 121.9' - Fractures (2), horizontal,	Ш	trace casts/cavities up to 3/4"x3/8", 10% casts/cavities at 120.0-120.75'	_		
			5	rough, undulating, open 122.2-122.3' - Fracture, 45 deg, rough,	Ш	with partial (carbonate) infilling	R18: 4 minutes		
125	125.0		NR	undulating, open	Ш	No Recovery 124.5-125.0'			
-82.2	0.9			124.1, 124.2' - Fractures (2), horizontal, — rough, undulating, open	Ш	Limestone	_		
-			>10	124.2-124.35' - Fracture, vertical, smooth,	Ш	- 125.0-126.45' - pale yellowish brown,	-		
-				planar, open	Ш	(10YR 6/2), fine grained, mild HCl reaction, weak (R2), weathered,	-		
-			>10	124.3, 124.7' - Fractures (2), 10 deg, rough, undulating, open	$\vdash$	- 10-15% (<1/16") voids, trace small	-		
_				125.0-125.6' - Fracture zone (8)	Ш	(1/16"-1/4")voids, 5-10%	_		
	R19-HQ 5 ft	0		125.6' - Fracture, horizontal, rough,	Н	casts/cavities up to 1-3/16"x3/4", poorly fossiliferous	_		
	40%	0		undulating, open		126.45-127.0' - Same as			
]			l	125.6-125.9' - Fracture, 75 deg, rough, undulating, open	H	125.0-126.45' except weak to	1		
			NR	125.9-126.05' - Fracture, 75 deg, rough,	Ш	<ul> <li>medium strong (R2 to R3), trace voids up to 1/16", no fossils</li> </ul>	1		
-				undulating, open 126.05-126.3' - Fracture zone	╁┼	casts/cavities	R19: 5 minutes		
-				126.05-126.3' - Fracture zone 126.45-126.6' - Fracture zone	団	No Recovery 127.0-130.0'	-		
130 -87.2	130.0			126.55-127.0' - Fracture, vertical, rough, —	H	Limostono	-		
-01.2			>10	undulating, tight	口	Limestone - 130.0-133.1' - yellowish gray, (5Y	]		
				126.75' - Fracture, horizontal, rough, undulating, open	Н	7/2), fine grained, mild HCl reaction,			
				126.75-127.0' - Fracture, 60 deg, rough,	Ш	weak to medium strong (R2 to R3),	SC-6 collected at 131.2-		
			1	undulating, tight	$\vdash$	<ul> <li>trace voids (&lt;1/16), no visible casts/cavities, dark gray to black</li> </ul>	132.1'		
-	R20-HQ			130.0-130.15 - Fracture, vertical, rough,	世	irregular laminae at 130.5-131.0'	-		
-	5 ft	45	2	130.15' - Fracture, horizontal, rough, planar,	╁┴╂	-	-		
-	78%			open .	ш		-		
			1	130.15-130.85' - Fracture, vertical, rough, undulating, 1/4" relief	$\vdash\vdash$	133.1-133.3' - Same as 130.0-133.1'	_		
				130.75' - Fracture, horizontal, rough,	罝	except very fine to fine grained, moderate HCl reaction, medium			
			NR	undulating, open	Ш	strong (R3)	R20: 5 minutes		
135	135.0		INIT	130.8-131.0' - Fracture zone	Ш	-	1		
100	100.0				1 1				
							-		



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SHEET 8 OF 8

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723171.1 N, 458054.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 4.7	2 ft b	gs on 3	3/12/07 START : 5/22/2007 END : 5/	23/20	07 LOGGER : R. Gomez	
≥0≎	- (%			DISCONTINUITIES	၂ ပွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ATICE ATICE	TRU VEF	R Q D (%)	T.0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
TEN HE	ECC	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-92.2	074	Ω.	ΞЪ		S		
-92.2			>10	131.0-131.2' - Fracture, vertical, rough, undulating, open	世	133.3-133.9' - moderate yellowish - brown, (10YR 5/4), fine grained, mild	1
				132.3-132.7' - Fracture, 60 deg, rough,	₽	HCl reaction, very weak to weak (R1	_
			1	undulating, open 132.7-132.9' - Fracture, 60 deg, rough,		to R2), trace voids up to 1/16", 5-10% casts/cavities up to 3/8"x3/8",	
			'	undulating, open	Н	poorly fossiliferous	
1 1	R21-HQ			133.1' - Fracture, horizontal, rough,		No Recovery 133.9-135.0'	1
1 1	5 ft 76%	37	6	undulating, open 135.0-135.15' - Fracture zone		L Limestone 135.0-138.8' - yellowish gray, (5Y	1 1
	10,0		_	135.5-135.65' - Fracture, horizontal, rough,		8/1), 30% medium light gray mottling,	1
1 -			5	undulating, open 136.5', 137.2', 137.3' - Fractures (3),	世	<ul> <li>very fine grained, moderate HCl reaction, medium strong (R3), trace</li> </ul>	1
-				horizontal, rough, undulating, 1/4" relief	╁╌	voids to 1/16", 10% casts/cavities up	R21: 7 minutes
-			NR	137.4' - Fracture, horizontal, rough,	Ė	to 2"x3/8", partial infill of cavities	-
140 -97.2	140.0			undulating, open 137.6' - Fracture, horizontal, rough,	世	No Recovery 138.8-140.0' Limestone	_
57.2			8	undulating, open, black organic staining over	$\vdash$	- 140.0-141.8' - yellowish gray with	-
				75% of fracture surface 137.9-138.0' - Fracture zone	口	very pale orange mottling, (5Y 7/2	1
			>10	138.0-138.3' - Fracture zone, horizontal,	┢	with 10YR 8/3), very fine to fine grained, moderate to strong HCl	<u> </u>
			. 10	rough, undulating, tight to healed, 1/2"	F	reaction, weak to medium strong (R2	]
	R22-HQ 5 ft	7	>10	spacing between fractures 140.0-140.2' - Mechanical break (2)	Ľ	to R3), 10% voids (up to 1/16") at 140.35-140.65', 141.05-141.3' and	
	50%	'		140.4-140.5' - Fracture, 60 deg, rough,	Н	141.5-141.6', no visible	
1 1				undulating, open 140.5' - Fracture, horizontal, rough,	Ш	casts/cavities, trace small (<1/16")	1
1 1			NR	undulating, open	╁	pyrite inclusion present throughout core but more noticeable along	1
1 1				140.5-140.9' - Fracture, vertical, smooth,	F	fractures	R22: 6 minutes
145	445.0			undulating, tight, "V" shaped 140.65' - Fracture, horizontal, rough,		141.8-142.5' - pale yellowish brown, (10YR 6/2), fine to medium grained,	1
145 -102.2	145.0			undulating, open —	╁	mild to moderate HCl reaction,	_
-			>10	140.75, 140.95' - Fracture, horizontal, smooth, planar, tight		extremely weak (R0), trace voids up	1
1 -				141.3' - Fracture, horizontal, rough,		to 1/16", no cavities  No Recovery 142.5-145.0'	1
1 -			>10	undulating, 1/8" relief 141.65', 141.8' - Fracture, 75 deg, smooth,	$\vdash$	Limestone	1 -
-	D00 110			undulating, open	Ë	145.0-146.0' - pale yellowish brown to moderate yellowish brown, (10YR	-
	R23-HQ 5 ft	53	3	141.8-142.5' - Fracture zone	₽	_ 6/2 to 10YR 5/4), medium grained,	_
	78%			145.75-145.9' - Fracture zone 146.0' - Fracture, 5 deg, rough, undulating,	$\Box$	mild HCl reaction, weak (R2), 10% voids (up to 1/16"), trace	_
			4	open	口	casts/cavities (up to 3/4"x3/8"), trace	
				146.75-147.0' - Fracture zone 147.45' - Fracture, horizontal, rough, planar,	$\vdash$	black inclusions (up to 1/16")	
]			NR	1/8" relief	广	146.0-146.0' - Same as 145.0-146.0' except fine to medium grained, trace	R23: 6 minutes
150	150.0			147.8', 148.1' - Fracture, 50 deg, rough,  planar, 1/4" relief, 30% black staining	H	voids up to 1/16", trace infilled	1
-107.2				(possibly pyrite) on surface		cavities 146.7-147.45' - Same as	Total depth of hole 150.0'
1 1				\ 148.35' - Fracture, horizontal, rough,	1	145.0-146.0'	1
				\undulating, tight	1	147.45-148.9' - pale yellowish brown with very pale orange and light gray	1
1 -					1	mottling, (10YR 6/2 with 10YR 8/2	-
					1	and N7), fine grained, moderate HCl	-
					1	reaction, weak to medium strong (R2 to R3), 5% voids up to 1/16"	1 -
-					+	<ul> <li>(decreasing with depth), no visible</li> </ul>	-
					-	cavities No Recovery 148.9-150.0'	-
					-	Bottom of Boring at 150.0 ft bgs on	-
					-	5/23/2007	
					-		



PROJECT NUMBER:	BORING NUMBER:
338884.FL	A-22

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SHEET 1 OF 11

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-7/8 tri-cone bit

ORIENTATION: Vertical

WATER	LEVELS	: 6.6 ft bo	gs on 3/23	3/07 S	START : 3/22/2007 END : 3/27/2007 LOGGER	R : N.	Jarzyniecki
				STANDARD	SOIL DESCRIPTION	U	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLIC LOG	
1 BE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	OLIC OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
TPT.			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	YMB	INSTRUMENTATION
42.6				(N)		Ś	10:00 Bosin drilling with 2.7/9" tri cone hit
42.6					-		10:08 Begin drilling with 2-7/8" tri-cone bit
_					-		Soil sampling every 5' from 3.5' below
_					-		ground surface
_					<u>-</u>		_
-					<u>-</u>		_
_					-		_
_	3.5				D 1 0 1 10 100 100 000	76.17	_
_				3-3-3	Poorly Graded Sand With Silt (SP-SM) 3.5-4.4' - moderate yellowish brown with dusky brown, -	陆	_
_		0.9	SS-1	(6)	L (10YR 5/4 with 5YR 2/2), wet, loose, very fine to fine L	13	-
5	5.0				grained, 10% organics, 10-15% nonplastic fines, sand		_
37.6					_		_
_					<u>-</u>		_
_					<u>-</u>		_
-					-		_
-					-		_
-					-		_
-	8.5				0:14 (841.)	<b>.</b>	
-				12-16-13	Silt (ML) 8.5-9.6' - yellowish gray, (5Y 7/2), wet, very stiff, -	$\  \ $	_
_		1.1	SS-2	(29)	nonplastic, rapid dilatancy, moderate HCl reaction,		_
10 <u> </u>	10.0				10% very fine sand-sized material, coarse gravel-size limestone fragments (white [N9] to yellowish gray [5Y		
32.6					8/1] at top of sample, strong HCl reaction), all carbonate		_
-					Calbonate		_
-					-		_
-					-	-	-
_					-	-	_
-					-	l	-
-	13.5				Silt With Sand (ML)	-	
-		0.9	SS-3	28-78/11.5 (82")	13.5-14.4' - Same as 8.5-9.6' except hard, 25% very		-
-	14.5			(02)	fine to fine sand-sized material, one coarse gravel-sized limestone fragment	ш	-
15 27.6					graver sized infrestoric magnitum	ł	-
					-	ł	-
-					-	ł	-
-					-	ł	-
-					-	ł	-
-					-	ł	-
-					-	1	-
-		0.2	SS-4	50/4.5	Limestone Fragments	Ь	-
-	10.9	0.2	00-4	(50/4.5")	18.5-18.7' - yellowish gray, (5Y 7/2), mild to moderate		-
-					HCI reaction, fragments to 1/2", 25% silt- and sand-sized carbonate materials similar to 13 5-14 4'	ł	-
20					SEE SEE SEE SEE SEE SEE SEE SEE SEE SEE	$\vdash$	-
						1	
	18.5	0.2	SS-4	50/4.5 (50/4.5")	Limestone Fragments  18.5-18.7' - yellowish gray, (5Y 7/2), mild to moderate HCI reaction, fragments to 1/2", 25% silt- and sand-sized carbonate materials similar to 13.5-14.4'		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 6.6 ft bo	gs on 3/23	3/07 5	START : 3/22/2007 END : 3/27/2007 LOGGER : N. Jarzyniecki
				STANDARD	SOIL DESCRIPTION O COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	⊥ (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE ACE ATIO		RECOVE	:RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
LEV.			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
22.6				(14)	
-	1			1	- <del>-</del>
-	1				
-	1				
-	1				1 1
-	1				1
	23.5			l]	11
[	23.9	0.4	SS-5	50/5.5 (50/5.5")	Silt With Sand (ML) 23.5-24.0' - yellowish gray, (5Y 7/2), moist to wet,
	]			(50/5.5")	hard, nonplastic, high dilatancy, mild to moderate HCI /
25					reaction, 20% very fine to fine grain material, traces of coarse sand-sized grains, all carbonate
17.6					
_					_
-					
-	-				
-	-				
-	-				
-	28.5				Silty Sand (SM)
-	-	1.2	SS-6	20-43-36	28.5-29.7' - dusky yellow, (5Y 6/4), moist to wet, very - 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-	1	1.4	SS-0	(79)	dense, fine to coarse grained, rapid dilatancy, mild to moderate HCl reaction, 47% nonplastic fines, trace
30 <u> </u>	30.0		$\vdash$	<del>                                     </del>	fine gravel, all carbonate
-	1				- <del>-</del>
-	-				
-	1				
-	1				
-	1				1 1
-	33:5				1
-	33.0	0.0	SS-7	50/0.75 (50/0.75")	No Recovery 33.5'
				(30/0.73)	
35				1	
7.6				1	_
-					-
-	-				Driller's Remark: Chatter at 36-37'
-	-				
-	-				
-	<u> </u>				
-	38.5				<del>                                     </del>
-	-	1.5	SS-8	41-31-50/5.75	
40	40.0	1.5	00-0	(81/11.75")	<b>-</b>
40_	40.0				
			1	1	



PROJECT NUMBER:	BORING NUMBER:

338884.FL A-22

## **SOIL BORING LOG**

SHEET 3 OF 11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER LEVELS : 6.6 ft bgs on 3/23/07									
				STANDARD	SOIL DESCRIPTION		္ပ	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	OOU NAME LIGOO OF SUIT OVERTON OOUS		SYMBOLIC LOG	DEDTILOF OLONIO CONTINUO CATE	
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	3	g g g	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
LEV.			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		3¥.WE	INSTRUMENTATION	
2.6				(14)	Silty Sand (SM)	<del>7                                     </del>			
-					38.5-40.0' - moderate olive brown, (5Y 4/4), wet, very dense, fine to coarse grained, mild to moderate HCI	/1		-	
-					reaction, 20-25% low plastic fines, 10% fine gravel-sized material	1		_	
					graver-sized material	]			
_						1		_	
_						4		-	
-	43.5				Silt With Sand And Limestone (ML)	4.	$\dashv$	-	
-		1.0	SS-9	24-50/6 (74/12")	43.5-44.5' - dusky yellow, (5Y 6/4), wet, hard, low	-	Ш	_	
<sub></sub> -	44.5			(14/12)	plasticity, rapid dilatancy, mild to moderate HCl	H	Щ	-	
45 <u> </u> -2.4					(varies throughout sample), limestone lens at 43.8-43.9', organic lens 1/8" thick at 43.65'	$\mathcal{H}$		<del>-  </del>	
-					170.0-43.8, Organic iciis 1/0 tilick at 43.03	+		-	
-						1		-	
-						1		_	
						]			
						]			
_	48.5						1115	_	
-		1.0	SS-10	22-9-2 (11)	Silty Sand With Limestone (SM) 48.5-50.0' - moderate yellowish brown, (10YR 6/4),	4		-	
-	49.5			(11)	wet, medium dense, fine to coarse grained, mild to moderate HCl reaction, 37% low plastic fines,	$\mathcal{H}$	Щ	-	
50 -7.4					limestone lenses at 48.6', 48.8', 49.3'	+			
-						+		-	
-						1		-	
-						1		-	
-						1		_	
						]			
-	53.5				0 1 0 1 (11)	1	$\prod$	_	
-				19-34-48	Sandy Silt (ML) 53.5-55.0' - moderate olive brown, (5Y 4/4), wet, hard,	$\parallel$		-	
-		1.5	SS-11	(82)	low plasticity, slow to rapid dilatancy, mild HCl reaction, 35-40% fine to coarse sand-sized grains, all	$\parallel$		-	
55 <u> </u>	55.0				carbonate, organic lenses (olive gray [5Y 3/4]) at	$\mathcal{H}$	Щ		
-					\54.5-55.0'	+		-	
-						+		-	
-						1		-	
-						1		_	
						]			
_	58:5		00.15				$\perp$	_	
_		0.1	(SS-12)	50/2 (50/2")	Sandy Silt (ML) 58.5-58.7' - Same as 53.5-55.0' except with organics	/ [		-	
-				, ,		+		-	
60						+	4		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-22	SHEET	4	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 6.6 ft bo	gs on 3/23	3/07 S	TART : 3/22/2007 END : 3/27/2007 LO	GGER	: N.	Jarzyniecki
				STANDARD	SOIL DESCRIPTION		<sub>O</sub>	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	RECOVE	- ' '	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPT SURF ELEV,			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYME	INSTRUMENTATION
-17.4 - - - -						- - -		- - -
- - - 65 -22.4	63.5	0.8	SS-13	40-50/5.5 (90/11.5")	Silt With Sand (ML) 63.5-64.3' - yellowish gray, (5Y 7/2), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 15-25% fine to coarse sand-sized grains, light olive gray (5Y 5/2) laminations at 64.1-64.2'			- - - -
- - - -	<u>68:5</u>					- - - -		- - - - -
_	- 00.0	0.0	SS-14)	50/1.5 (50/1.5")	No Recovery 68.5'	_/_		4" HW casing set to 70' below ground surface -
-				(00.110)		_		-
70 -27.4 - - - -						- - - -		16:56 Resume drilling, clearing hole
-	73.5					-		3/22/07 End drilling for the day at 73.5'
75_ -32.4 - - - -	73.8	0.3	SS-15	50/4 (50/4")	Elastic Silt (MH) 73.5-73.6' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), wet, soft, low to medium plasticity, slow to rapid dilatancy, mild HCl reaction, trace fine to medium sand-sized material, white carbonate clay stringers throughout Silty Sand With Limestone (SM) 73.6-73.8' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), wet, dense, fine to coarse grained, mild HCl reaction, 32% low plastic fines, limestone lens a 73.6', all carbonate	2		3/23/07, 07:58 Water level 6.6' below ground surface - 08:17 Resume drilling by bringing up 73.5' sample -
- - - 80	78.5 78.8	0.1	SS-16	50/3 (50/3") /	Limestone Fragments 78.5-78.6' - dusky yellow, (5Y 6/4), mild HCl reaction fragments to 1/2", voids over 50% of surface	n,		- - -



PROJECT NUMBER:	BORING NUMBER:
338884.FL	A-22

SHEET 5 OF 11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

SAME   INTERVAL   #1   PARTIES   P	WATER	Jarzyniecki							
Sity Sand With Limestone (SM)   SS-17   S0/2   SS-17   S0/2   SS-18	300				STANDARD	SOIL DESCRIPTION		ō	COMMENTS
Sity Sand With Limestone (SM)   SS-17   S0/2   SS-17   S0/2   SS-18	ELOW SN (#)	SAMPLE		. ,	PENETRATION TEST RESULTS	SOIL NAME. USCS GROUP SYMBOL COLOR		IC LO	DEPTH OF CASING, DRILLING RATE
Sity Sand With Limestone (SM)   S8.5   S.5   S	TH BI FACE		RECOVE		011 011 011	MOISTURE CONTENT, RELATIVE DENSITY OR	,	/BOL	DRILLING FLUID LOSS, TESTS, AND
Sity Sand With Linestone (SM)	DEP SUR ELE			#TYPE	6"-6"-6" (N)	CONSISTENCT, SOIL STRUCTURE, MINERALOGT		N∖S	INSTRUMENTATION
88.5   1.3   SS-18   18-28-27   Sity Sand With Limestone (SM)   88.5-89.6' - Same as 78.5-78.6'	-37.4								_
88.5   1.3   SS-18   18-28-27   Sity Sand With Limestone (SM)   88.5-89.6' - Same as 78.5-78.6'	_						_		_
88.5  1.3 SS-18 18-28-27 (555)  90 90.0  47.4  93.5  1.2 SS-19 33-12-15 (27)  95 95.0  1.0 SS-20 10-8-2 (10)	_						_		Driller's Remark: Slight chatter during drilling
88.5  1.3 SS-18 18-28-27 (555)  90 90.0  47.4  93.5  1.2 SS-19 33-12-15 (27)  95 95.0  1.0 SS-20 10-8-2 (10)	-						-		-
88.5  1.3 SS-18 18-28-27 (555)  90 90.0  47.4  93.5  1.2 SS-19 33-12-15 (27)  95 95.0  1.0 SS-20 10-8-2 (10)	-	_					-		-
88.5  1.3 SS-18 18-28-27 (555)  90 90.0  47.4  93.5  1.2 SS-19 33-12-15 (27)  95 95.0  1.0 SS-20 10-8-2 (10)	-	83.5					-		-
88.5  1.3 SS-18 18-28-27 (55)  90 90.0 1.3 SS-18 18-28-27 (55)  1.3 SS-18 18-28-27 (55)  91 90.0 1.3 SS-18 18-28-27 (55)  1.3 SS-18 18-28-27 (55)  1.4 SS-19 18-28-27 (55)  1.5 SS-19 18-28-27 (55)  1.6 SS-19 18-28-27 (55)  1.7 SS-19 18-28-27 (55)  1.8 SS-19 18-28-27 (55)  1.9 SS-19 18-28-27 (55)  1.0 SS-20 10-8-2 (10)  1.0 SS-20 10-8-2 (10)  1.0 SS-20 10-8-2 (10)	-	83:7	0.1	SS-17		Limestone Fragments			-
88.5   Sitty Sand With Limestone (SM)   Side Section   Sitty Sand With Limestone (SM)   Side Section   Sitty Sand With Limestone (SM)   Side Section   Sec					(50/2)	\85.5-85.0 - Same as 78.5-78.6	_/		
88.5  1.3 SS-18 18-28-27 (55)  90 90.0  47.4  93.5  1.2 SS-19 33-12-15 (27)  95.95.0  1.0 SS-20 10-8-2 (10)	85								
1.3   SS-18   18-28-27 (55)   18-28-27 (55)   Sitty Sand With Limestone (SM)   88.5-89.8" - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10VR 4/2), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 20-25% nonplastic fines, 5-10% organics, 10% fine gravel-sized grains, limestone lens at 88.95', all carbonate   SS-19   33-12-15 (27)   SS-19   33-12-15 (27)   SS-19	-42.4	-					_		-
1.3   SS-18   18-28-27 (55)   18-28-27 (55)   Sitty Sand With Limestone (SM)   88.5-89.8" - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10VR 4/2), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 20-25% nonplastic fines, 5-10% organics, 10% fine gravel-sized grains, limestone lens at 88.95', all carbonate   SS-19   33-12-15 (27)   SS-19   33-12-15 (27)   SS-19	-	-					_		-
1.3   SS-18   18-28-27 (55)   18-28-27 (55)   Sitty Sand With Limestone (SM)   88.5-89.8" - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10VR 4/2), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 20-25% nonplastic fines, 5-10% organics, 10% fine gravel-sized grains, limestone lens at 88.95', all carbonate   SS-19   33-12-15 (27)   SS-19   33-12-15 (27)   SS-19	-	_					-		-
1.3   SS-18   18-28-27 (55)   18-28-27 (55)   Sitty Sand With Limestone (SM)   88.5-89.8" - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10VR 4/2), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 20-25% nonplastic fines, 5-10% organics, 10% fine gravel-sized grains, limestone lens at 88.95', all carbonate   SS-19   33-12-15 (27)   SS-19   33-12-15 (27)   SS-19	-						-		-
1.3   SS-18   18-28-27 (55)   18-28-27 (55)   Sitty Sand With Limestone (SM)   88.5-89.8" - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10VR 4/2), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 20-25% nonplastic fines, 5-10% organics, 10% fine gravel-sized grains, limestone lens at 88.95', all carbonate   SS-19   33-12-15 (27)   SS-19   33-12-15 (27)   SS-19	-	-					-		-
1.3   SS-18   18-28-27 (55)   88.5-89.8" - moderate yellowish brown to dark yellowish brown to dark yellowish brown to dark of 10 10 20 25% nonplastic fines, 5-10% organics f		88.5							
90. 90.0  47.4  93.5  1.2 SS-19 33-12-15 (27)  95 95.0  -52.4  1.0 SS-20 10-8-2 (10)	_				19 29 27	Silty Sand With Limestone (SM) 88.5-89.8' - moderate vellowish brown to dark	_		_
93.5  1.2 SS-19  95.0  -52.4  1.0 SS-20  1.0	-	-	1.3	SS-18		yellowish brown, (10YR 5/4 to 10YR 4/2), wet, very			-
93.5  1.2 SS-19 33-12-15 (27)  95 95.0 -52.4  1.0 SS-20 10-8-2 (10)		90.0				reaction, 20-25% nonplastic fines, 5-10% organics,	+		
1.2   SS-19   33-12-15   (27)   SS-19   33-12-15   (27)   SS-19   95.0	-						<sup>15'</sup> , / -		-
1.2   SS-19   33-12-15   (27)   SS-19   33-12-15   (27)   SS-19   95.0	-	-							-
1.2   SS-19   33-12-15   (27)   SS-19   33-12-15   (27)   SS-19   95.0	-						-		-
1.2   SS-19   33-12-15   (27)   SS-19   33-12-15   (27)   SS-19   95.0									
1.2   SS-19   33-12-15   (27)   SS-19   33-12-15   (27)   SS-19   95.0	-						-		-
95 95.0 1.2 SS-19 33-12-15 (27) 93.5-94.7' - moderate yellowish brown, (10YR 5/4), wet, mild to moderate HCl reaction, 60% limestone fragments to 1", 15-20% nonplastic fines, 20% fine to coarse sand, all carbonate  Driller's Remark: Lost circulation at 96'	-	93.5				Limestone With Silty Sand		H	-
95 95.0   (27)   fragments to 1", 15-20% nonplastic fines, 20% fine to coarse sand, all carbonate   Driller's Remark: Lost circulation at 96'	-	-	12	SS-19		93.5-94.7' - moderate vellowish brown. (10YR 5/4).	-	H	-
-52.4   Driller's Remark: Lost circulation at 96'	95	95.0		55 15	(27)	$\overline{}$ fragments to 1", 15-20% nonplastic fines, 20% fine	to /	Ë	-
98.5 1.0 SS-20 10-8-2 (10)		00.0				\coarse sand, all carbonate	_/-		_
98.5 1.0 SS-20 10-8-2 (10)									
1.0 SS-20 10-8-2 (10)	-						_		Driller's Remark: Lost circulation at 96'
1.0 SS-20 10-8-2 (10)	-						-		-
1.0 SS-20 10-8-2 (10)	-						-		-
1.0 SS-20 10-8-2 (10)	-	00 5					-		-
- 1.0   SS-20   (10)	-	90.0							- -
	-	]	1.0	SS-20					_
	100	100.0			(.0)				



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## **SOIL BORING LOG**

SHEET 6 OF 11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 6.6 ft bo	gs on 3/23	3/07 5	START : 3/22/2007 END : 3/27/2007 LOGGER : N. Jarzyniecki
300				STANDARD	SOIL DESCRIPTION O COMMENTS
AND (f)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, 의 DEPTH OF CASING, DRILLING RATE,
H BE ATIC		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  SOILMENTO  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
-57.4				(/	Limestone With Silty Sand
-	1				98.5-99.5' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), mild to
_					moderate HCl reaction, fine to coarse gravel-sized     Casing advanced to 100'
-					fragments to 1-1/2", soil fraction is fine to medium sand-sized grains with 32% nonplastic fines (varies in
					sample), limestone lens from 98.5-98.8', all carbonate   The carbonate   Driller's Remark: Slight loss of circulation at 102'
_					
_	103.5				
_				11-14-6	Silty Sand With Limestone (SM) 103.5-105.0' - moderate yellowish brown to dark
_	_	1.5	SS-21	(20)	yellowish brown, (10YR 5/4 to 10YR 4/2), wet, medium dense, fine to coarse grained, mild HCl
105 <u> </u>	105.0				reaction, 20% nonplastic fines, 30% fine to coarse
52					\langle gravel-sized limestone fragments, all carbonate \rangle \rangle Advancing casing to 105
-					
-					<b> </b>
-	-				<b> </b>
-					<b> </b>
_	198:5				<b>1</b>
	100.0	0.0	\SS-22	50/1.5 (50/1.5")	No Recovery 108.5' 3/23/07, 15:10 End soil sampling at 108.5' 3/23/07, 15:46 Preparing for rock coring
_				(30/1.3)	Begin Rock Coring at 109.0 ft bgs See the next sheet for the rock core log
110_					
-67. <del>4</del> -					-
-	_				<b> </b>
_	_				
-					
-					
-	-				<b>-</b>
-					<b> </b>
-	]				<b>1</b>
115_					_]
-72.4					<u> </u>
_					<b>.</b>
-					
-					<b>-</b>
-	-				
-	-				
-	-				
-	-				
120	1				
120					



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-22 SHEET 7 OF 11

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 6.6	ft bg	s on 3/	23/07 START : 3/22/2007 END : 3/	27/200	D7 LOGGER : N. Jarzyniecki	
≥0÷	(%)			DISCONTINUITIES	90	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
110	109.0		1	109.3' - Fracture, vertical, rough, undulating		Limestone 109.0-111.4' - light olive gray, (5Y 5/2), very fine grained, moderate HCl	3/23/07, 16:48 Start coring Note: R1 is short run (2.5') - to set stroke
-67.4 -	R1-NQ 2.5 ft 96%	28	2	109.7' - Fracture, 55 deg, smooth, undulating 110.0' - Fracture, vertical, smooth to rough, undulating		reaction, weak to medium strong (R2 to R3), poorly fossiliferous, voids up to 1/16"over 15-20% of surface,	R1: 2 minutes
-	111.5		2 NR	110.7' - Mechanical break 111.15, 111.35' - Fracture (2), 70 deg, smooth to rough, undulating		larger cavities/fossil molds up to 1/4"  x 1/2" over <5% of surface, <5% fine black inclusions	Slight loss of circulation during run, driller
-	-		2	112.1' - Mechanical break 112.2' - Bedding plane, <10 deg, smooth,		No Recovery 111.4-111.5'  Limestone 111.5-114.9' - Same as 109.0-111.4'	advancing casing to 111.5' 3/23/07 End drilling for the day at 111.5' -2/24/07, 07/54 water level
-	R2-NQ		3	undulating 112.85, 113.25' - Bedding plane (2), <20 deg, rough, undulating	Ħ	except medium strong (R3), with increasing fossil content, voids up to 1/16" over 20-25% of surface, fossil	3/24/07, 07:54 water level is 8.9' below ground surface
-	5 ft 70%	52	2	113.4' - Bedding plane, <10 deg, rough, undulating 113.5, 113.9' - Mechanical break		molds up to 1/4" x 1/8" on 5-10% of surface	08:17 Begin drilling SC-1 collected as 112.8- 113.5' - Slight circulation loss
115 <u> </u>	-		NR	114.9' - Fracture, 50 deg, rough, undulating — 115.2' - Bedding plane, <20 deg, rough to smooth, undulating		114.9-115.0' - Same as 111.5-114.9'     except extremely weak to medium strong (R0 to R3), limestone has	during R2-NQ run  R2: 18 minutes
-	116.5		IVIX	Shooti, anddading		moderate HCI reaction, silts have delayed mild HCI reaction No Recovery 115.0-116.5'	-
-	- - - - R3-NQ		4	117.05, 117.25, 117.4' - Bedding plane (3), 20 deg, rough, undulating		Limestone 116.5-120.6' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2),	-
-			3	117.7, 117.8, 117.9' - Bedding plane (3), <10 deg, smooth, planar 118.0, 118.75, 119.25, 120.0, 120.15' -		<ul> <li>very fine grained, very weak to medium strong (R1 to R3), fossiliferous with casts and molds up</li> </ul>	-
120	5 ft 82%	44	2	Bedding plane (5), <10 deg, smooth, planar, infill of fine grained material at 119.25'		to 1/4" x 1/2". Voids up to 1/16" over 25% of surface, larger cavities/molds up to 1/2" x 1/2" on <5% of surface,	-
-77.4 -			2	_		thinly bedded 	R3: 22 minutes
-	121.5		NR		H	_ _ _ Limestone	-
-			5	121.95' - Bedding plane, 20 deg, rough, undulating 122.0, 122.1, 122.3, 122.5, 122.6, 122.75,		<ul> <li>121.5-122.85' - light olive gray, (5Y</li> <li>5/2), fine grained, weak to medium strong (R2 to R3), voids (1/16") over</li> </ul>	-
-	R4-NQ		3	122.85, 122.9' - Bedding plane (8), <10 deg, smooth, undulating 123.65, 123.8, 123.95' - Bedding plane (3),		- 15-20% of surface, moderately fossiliferous with casts up to 1/4" x 1/4", larger cavities up to 1" x 1/2"	-
125	5 ft 84%	58	3	<10 deg, smooth to rough, undulating		over <5% of surface, thinly bedded 122.85-122.9' - medium light gray, (N6), very fine grained, medium	SC-2 collected at 124.0-
-82.4			0			— strong (R3), no voids/fossils/cavities 122.9-125.7' - Same as 121.5-122.85'	125.4' — R4: 15 minutes
-	126.5		NR	 		- No Recovery 125.7-126.5'	-
-			3	126.85' - Fracture, 85 deg, rough to smooth, undulating 126.95, 127.05' - Bedding plane (2),		-	SC-3 collected at 127.10- 128.15'
-	R5-NQ		1	horizontal, smooth, undulating 128.15' - Bedding plane, <10 deg, rough to smooth, undulating		-	-

ORIENTATION: Vertical



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SHEET 8 OF 11

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

				IENT . CIVIE 33 3/N 3 10023, ITIUU TOLATY, NQ LOOIS, FIVY C			
WATER	LEVELS : 6.6	ft bgs	s on 3		27/20		<u> </u>
> ~				DISCONTINUITIES	ڻ ان	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
띮꼬이	N 4.5	9	FRACTURES PER FOOT		윽	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
A H E	N TES	(%) O		DEPTH, TYPE, ORIENTATION, ROUGHNESS,	S S	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
F F F F	N.S. S. S. S. S. S. S. S. S. S. S. S. S.	Ö	₩.	PLANARITY, INFILLING MATERIAL AND	M	AND ROCK MASS	DROPS, TEST RESULTS, ETC.
E S E	222	ď	12.2	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	
	5 ft	48	4	128.55, 128.75' - Bedding plane (2),		Limestone	
-	80%			horizontal, smooth, undulating	╁	<ul> <li>126.5-128.7' - light olive gray, (5Y</li> </ul>	Circulation loss during run,
130_			>10	129.3, 129.7' - Mechanical break (2)	┵	5/2), fine grained, weak (R2), small	advancing casing —
-87.4			' ' '	129.4' - Bedding plane, 20 deg, smooth,	Н	(1/16") voids over 15% of surface,	advarioning dasing
_				undulating		- fossiliferous, fossil casts up to 1/2" x	R5: 21 minutes
_			NR	129.95-130.5' - Fracture zone		1/4", cavities 1" x 1/2" over <5% of	-
	131.5				$\vdash$	surface, light gray (N6) mottling at	
	1			131.5-131.7' - Fracture zone, 50-60 deg,	┰	<ul> <li>128.15-128.7' with decrease in small voids (&lt;1/16") to &lt;5%</li> </ul>	1
-			>10	intersecting fractures	+	128.7-130.5' - dusky yellow, (5Y 6/4),	-
				400 (1 7 1 1 7 1 1 1 1		- extremely weak to very weak (R0 to	
				132.4' - Bedding plane, <5 deg, smooth to	Ш	R1), small (<1/16") voids over 35%	]
-			>10	rough, planar	+	of surface, highly fossiliferous	-
_			L	132.7-132.8' - Fracture zone 132.9' - Bedding plane, <5 deg, smooth to	_	- No Recovery 130.5-131.5'	-
	R6-NQ	<b>-</b> ^	_	rough, planar	Ш	Limestone	
	5 ft	53	2	133.1' - Bedding plane, <10 deg, rough,	1—	<sup>–</sup> 131.5-135.5' - light olive gray, (5Y	
-	80%		-	undulating	╀┷	<ul> <li>5/2), fine grained, weak to medium</li> </ul>	-
135_			3	134.35, 134.5' - Fracture (2), 20 deg, rough, _	$\rfloor \top \!\!\!\! \top$	strong (R2 to R3), small (<1/16")	
-92.4			۱ ،	undulating		voids over 15-30% of surface	-
-			<b>-</b>	134.6' - Fracture, 70 deg, rough, undulating	╙	_ increasing with depth, larger cavities	Lost circulation at 135'
_			NR	135.0' - Fracture, 15 deg, smooth, planar	┢┯	up to 1" x 1" over 10% of surface, discontinuous black organic laminae	R6: 5 minutes
	136.5		' '' `	135.1' - Bedding plane, horizontal		(<5%), interbed of very fine grained	
						light olive gray (5Y 5/2) dense	1 7
-			>10	136.8-137.05' - Fracture zone	<b>-</b>	limestone with <5% voids (<1/16")	-
				137.25' - Bedding plane, <15 deg, rough,		_ over surface	
				undulating	Н	No Recovery 135.5-136.5'	
-			>10	137.4' - Bedding plane, associated with cavity	Ė	Limestone	-
_				137.95' - Fracture, 15-20 deg, rough,	$\perp$	_ 136.5-139.7' - yellowish gray to light	_
	R7-NQ		_	undulating	Н	gray, (5Y 8/1 to N7), weak to medium	
_	5 ft	36	2	138.4-138.55' - Fracture zone	1	- strong (R2 to R3), small voids (<1/8")	1
-	64%		0	138.95' - Mechanical break		over 10-20%, generally increasing	-
140			$\vdash$	139.15, 139.45' - Bedding plane or		with depth, larger cavities up to 1/2" x — 1" over up to 10% of surface, partial	
-97.4				mechanical break (2), 10-15 deg, rough to	Н	infilling of cavities with soft medium	
-			NR	smooth, undulating	$\Box$	light gray (N6) material	R7: 8 minutes
-						- No Recovery 139.7-141.5'	_
	141.5				Щ	• • • • • • • • • • • • • • • • • • • •	3/24/07 End drilling for the
]				141.65-141.8' - Fracture zone	1—	Limestone	day at 141.5' - 3/25/07. 07:59 Water level
-			>10	141.65-141.8 - Fracture Zone 141.9' - Fracture, 60 deg, smooth, partial	1	<ul> <li>141.5-141.8' - medium gray, (N5),</li> </ul>	2.9' below ground surface
I _				mineralization on surface, open		weak to medium strong (R2 to R3),	08:41 Resume drilling –
				142.0' - Bedding plane, <5 deg, smooth,		20% small voids (<1/16") over	co. 11 1 tooding drining
-			>10	undulating, stains on surface	1-	- surface, cavities up to 1/4" x 1/4"	1
-	B		<u> </u>	142.1, 142.2' - Fractures (2), 85 deg, smooth	+	<10% of surface	1
	R8-NQ	25	_	to rough, mineralization on surface		141.8-143.5' - yellowish gray with light gray and brownish gray interbed	1
1 7	5 ft 74%	35	2	143.15, 143.55' - Bedding plane (2), <10 deg,	Щ	layering, (5Y 7/2 with N7 and 5Y 4/2),	1
-	1470			rough to smooth, undulating	+	very fine grained, strong to very	-
145			6	144.3' - Bedding plane, <5 deg, smooth,	╁┼	— strong (R4 to R5), small (<1/16")	
-102.4			-	undulating to planar, slight staining (<20%)	Ш	voids <5" coverage, poorly	1
-			l	on fracture surface		fossiliferous	R8: 14 minutes
-			NR	144.5' - Bedding plane, <20 deg, smooth to rough, undulating, partially associated with	$\vdash$	- 143.5-144.5' - Same as 141.8-143.5'	
	146.5		1	organic lens	$\vdash$	except weak to medium strong (R2 to	
I -				144.75' - Bedding plane, smooth, undulating		R3), interbedded with light olive gray	Driller's Remark:
-			>10	145.05-145.15' - Fracture zone	仜	_ (5Y 5/2), highly fossiliferous layers	Circulation loss 100% near
				146.5-146.7' - Fracture zone	$\vdash$	exhibiting small voids (<1/16") over	beginning of run R9
]				147.7, 147.85' - Bedding plane (2), <20 deg,	$\vdash$	30% of surface	SC-4 collected at 147.0-
-			3	smooth, undulating		-	147.8'
-				147.95, 146.9' - Mechanical break	匚	<u></u>	] -
	R9-NQ			Modianion broak	Ш		
			1		1		



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS: 6.6	ft bgs	s on 3/	23/07 START: 3/22/2007 END: 3	/27/200	D7 LOGGER : N. Jarzyniecki			
<0 €	(%			DISCONTINUITIES	ပ္က	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
150 -107.4	5 ft 75%	62	1 2 NR	148.15' - Bedding plane, <15 deg, smooth, undulating, associated with slightly softer zone 148.85' - Bedding plane, <5 deg, smooth, planar 149.95, 150.15' - Mechanical break (2)		Limestone - 144.5-145.2' - dusky yellow, (5Y 6/4), weak to medium strong (R2 to R3), 30% small voids (<1/16"), similar to interbeds 143.5-144.5' No Recovery 145.2-146.5'	R9: 7 minutes		
-	151.5			· · · · · · · · · · · · · · · · · · ·		Limestone  146.5-150.25' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2),	Casing advanced to 151'		
_			>10 4	151.9-152.4' - Fracture zone, smooth to rough, undulating, zone of organic layering 152.9, 153.25, 153.4' - Bedding plane (3),		fine grained, medium strong to strong (R3 to R4), poorly to moderately fossiliferous with fossil casts/molds up to 1/2" x 1/4", small 1/16" voids	- -		
-	R10-NQ 5 ft	53	>10	15-20 deg, smooth to rough, undulating 153.45' - Fracture, 65 deg, rough, undulating, medium gray infill (N5) infill on fracture face	Ħ	<ul> <li>over &lt;10% of surface increasing to 35% over interval from 147.9-148.9'</li> <li>No Recovery 150.25-151.5'</li> </ul>	-		
155_ -112.4			1	153.55' - Fracture, 25 deg, smooth to rough, undulating, black staining on 50% of surface 153.9-154.15' - Fracture zone 154.3' - Bedding plane, <20 deg, organic		Limestone 151.5-155.8' - yellowish gray, (5Y 7/2), fine grained, weak to medium strong (R2 to R3), poorly	_		
-			0 NR	laminations throughout 155.25' - Bedding plane, <20 deg 155.6' - Mechanical break		fossiliferous, <5% small 1/16" voids over surface, fine black organic lamination from 153.9-154.3'	R10: 9 minutes		
-			156.6, 157.6' - Bedding plane (2), 10 deg, smooth to rough, undulating 157.25, 159.75' - Mechanical break	Ħ	No Recovery 155.8-156.5'  Limestone 156.5-159.95' - yellowish gray, (5Y 7/2), fine grained, weak to medium	-			
-	R11-NQ		3	157.8, 157.9, 158.75' - Bedding plane (3), <5 deg, planar	Ħ	strong (RŽ to R3), poorly fossiliferous, <5% small (1/16") voids, interval from 159.0-159.5' is	-		
160_	5 ft 69%	53	1	159.0-159.5' - Bedding plane, 30 deg, smooth, planar, organic staining on 35% of surface at 159.5'	smooth, planar, organic staining on 35% of	<ul> <li>laminated with alternating colors of dusky yellow (5Y 6/4) and light olive gray (5Y 5/2), laminations are</li> <li>inclined 30%, olive gray material is</li> </ul>	_		
-117.4 - -	161.5		NR			fine grained and is medium strong to strong (R3 to R4)  No Recovery 159.95-161.5'	R11: 15 minutes -		
-						No Recovery 161.5-166.5'	-		
-	R12-NQ 5 ft	0	NR			- - -	- - -		
-165_ -122.4	0%			-			- - -		
-	166.5				Ħ	-	R12: 2 minutes		
-			7	167.3' - Bedding plane, horizontal, smooth, planar	H	_	-		
-	R13-NQ		2 >10	167.5-167.7' - Bedding plane, horizontal, smooth, planar		-	-		



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#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 6.6 ft bgs on 3/23/07 START: 3/22/2007 END: 3/27/2007 LOGGER: N. Jarzyniecki LITHOLOGY DISCONTINUITIES COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS 5 ft 168.4' - Bedding plane, 10 deg, smooth, Limestone 54% 166.5-169.2' - light olive gray, (5Y undulating 5/2), moderate HCI reaction, medium 170 168.55' - Fracture zone, 1-3" pieces 168.6' - Bedding plane, 15 deg, rough, strong to strong (R3 to R4), zones -127.4 NR and blebs of 30-50% small (<3/16") undulating, open R13: 8 minutes voids alternating with fine grained material with few voids, void-rich Casing advanced to 170' 171.5 zones occur along undulating 3/25/07 End of drilling for 171.5, 171.6, 171.9, 172.2, 172.4, 173.0, bedding planes, larger cavities/fossil molds (up to 1/2" x 3/4") vary from the day at 171' 173.15' - Bedding plane (7), horizontal, >10 3/26/07, 08:05 Cleaning smooth, planar <5-10% over surface out hole to resume drilling No Recovery 169.2-171.5' >10 Limestone 173.1' - Fracture, 80 deg, smooth, undulating 171.5-176.2' - light olive gray, (5Y 173.4-173.8' - Fracture zone, 3/4"-2" R14-NQ 5/2), dense, very fine grained, fragments >10 5 ft 50 moderate HCl reaction, strong (R4), 173.95' - Fracture, horizontal, rough, 94% thinly laminated in zones 2-4" thick undulating, black staining on 50% of surface alternating with zones of 25-30% 175 174.2' - Fracture or mechanical break, 10 >10 small (<1/8") voids and few (<5%) -132.4 deg, rough, undulating larger cavities up to 1/2" diameter 174.5' - Fracture, horizontal, rough, planar SC-5 collected at 175.4-0 174.8-175.2' - Fracture zone 176.2' R14: 13 minutes NR 176.5 No Recovery 176.2-176.5' SC-6 collected at 176.5-Limestone 176.5-178.8' - light olive brown to 1 177.45 yellowish gray, (5Y 5/6 to 5Y 7/2), strong HCl reaction, strong (R4), fossiliferous with casts/molds up to 177.75' - Fracture, horizontal, rough, >10 undulating 1/2", small (1/16") voids over 10-20% 177.75-178.8' - Fracture zone, 3/4"-3" R15-HQ of surface occuring in zones, very fragments 5 ft 19 fine lens of rock with no voids 46% No Recovery 178.8-181.5' 180 NR  $-137\overline{4}$ R15: 107 minutes Stop drilling to mix mud 181.5 181.5-181.75' - Fracture zone, 1"-2" Limestone >10 fragments 181.5-182.6' - moderate olive brown 182.05' - Bedding plane with light olive gray zones, (5Y 3/4 >10 182.3-182.6' - Fracture zone, 1"-3" fragments with 5Y 3/4), fine to very fine grained, moderate to strong HCl reaction, strong (R4), <5% small (1/16") voids, poorly fossiliferous R16-NQ No Recovery 182.6-186.5' 5 ft 22% 0 NR 185 142.4 R16: 15 minutes 186.5 186.5-186.9' - Fracture zone, 3/4"-2" >10 fragments 187.55' - Fracture, 25 deg, rough, undulating >10 187.85' - Bedding plane, rough, stepped 188.35-188.65' - Fracture zone R17-NQ >10



PROJECT NUMBER:	BORING NUMBER:					
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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723199.8 N, 458088.0 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS: 6.6	ft bg	s on 3/	23/07 START: 3/22/2007 END: 3	/27/20	07 LOGGER : N. Jarzyniecki	
≥∩≘	_ (9			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
190 -147.4 -	5 ft 48%	22	NR	188.7' - Fracture, 80 deg, rough, stepped, black fine particles on fracture face		Limestone  - 186.5-188.9' - Same as 181.5-182.6' - except increasingly mottled moderate olive brown and light olive gray, (5Y 4/4 and 5Y 5/2), fossils casts/molds up to 1/4" x 1/2", small (1/16") voids over 15% of surface, except <5%	R17: 12 minutes
- - - - 195 -152.4	191.5 R18-NQ 5 ft 42%	25	5 4 0 NR	192.0-193.5' - Bedding plane, numerous 2" long bedding plane 192.25' - Bedding plane, <15 deg, rough, undulating, organic staining 192.75, 193.1' - Fracture (2), 75 deg, rough, undulating, black staining		over 18/8.2-188.4', moderate HCI reaction, medium strong to strong (R3 to R4) rock  No Recovery 188.9-191.5' Limestone  191.5-193.6' - olive brown, (5Y 4/4), fine grained, moderate HCI reaction, medium strong to strong (R3 to R4), less than 5% small (<1/16") voids on surface, highly fossiliferous, casts/molds up to 1/4" x 1/4"  No Recovery 193.6-196.5'	R18: 10 minutes 3/26/07, 17:31 End drilling
	R19-NQ 5 ft 50%	28	>10 >10 0 NR	196.5, 196.6, 197.55, 197.7, 197.9, 198.1' - Fractures (6), 0-15 deg, mostly rough and undulating, semi planar, organic black staining 196.5-198.9' - Fracture zone, rough, undulating, numerous 0-25 deg. fractures over 1-2" intervals 196.85' - Fracture, 50 deg, rough, undulating, black organic staining		Limestone  196.5-199.0' - light olive gray to dark yellowish orange mottled, (5Y 5/2 to 10YR 6/6), dense, fine grained, moderate to strong HCl reaction, strong to very strong (R4 to R5), moderately fossiliferous, fossil casts up to 1/4" x 1/4", small 1/16" voids over <10% of surface  No Recovery 199.0-201.5'	for the day at 196.5' 3/27/07, 07:51 Water level is 3.3' below ground surface 08:05 Resume drilling
	201.5			_		Bottom of Boring at 201.5 ft bgs on 3/27/2007	3/27/07, 09:30 Boring total depth 201.5' Water level at 3.5' below ground surface



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	Δ-22Δ	SHEET	1 OF 7

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723191.2 N, 458083.4 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8 tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 4.0 ft b	gs on 6/13	3/07 S	START : 6/13/2007 END : 6/14/2007	LOGGER	: C.	Sump
				STANDARD	SOIL DESCRIPTION		G	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	RECOVE		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLO MOISTURE CONTENT, RELATIVE DENSITY	PR, OR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
42.9			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERAL	OGY	SYME	INSTRUMENTATION  A-22A is re-drill of A-22 with intent of starting
-	-					- - -		rock coring at approximately 35.0'  Blind drill in soils to 35.0'
- - -						-		Driller's Remark: Sand at 2.0'
5 37.9						-		Water level 4.0' below ground surface
-								-
-	-					-		Driller's Remark: Tan silt at 8.0'
- 10_ 32.9	-					-		- - -
-	-					- - -		- - -
-	-					-		- - -
-	-					-		Driller's Remark: Weak sandy limestone at -14.3'
15 <u> </u>	-					-		
-	-					-		Driller's Remark: Harder limestone at 17'
-	-					-		- - -
20								_



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338884.FL	A-22A	SHEET	2	OF	7	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723191.2 N, 458083.4 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8 tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 4.0 ft bo	gs on 6/13	3/07	START : 6/13/2007 END : 6/14/2007 LOGO	GER:	: C.	Sump
				STANDARD	SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		$\sqcap$	SYMBOLIC LOG	
H H		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
HT4			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		/MB(	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
S S				(N)		4	S	
22.9						4		_
-						4		_
_						4		
_						4		Driller's Remark: Sandy silt with weak limestone at 21.5', gravel-sized clasts
-						4		-
-						4		<u>-</u>
_						4		<u>-</u>
_						4		-
_						4		_
25 <u> </u>						$\dashv$		_
- 17.5						4		-
-						Ⅎ		Driller's Remark: Weak sandy limestone at
-						$\dashv$		26.0' -
-						Ⅎ		<del>-</del>
-						$\dashv$		<del>-</del>
-						$\dashv$		Driller's Remark: Carbonate silt at 28-29'
-						$\exists$		-
-						$\exists$		-
						$\exists$		-
30 <u> </u>						$\exists$		_
-						1		-
-						1		<del>-</del>
-						1		-
-						1		_
-						1		<del>-</del>
-						1		-
-						-1		Driller's Remark: Hard limestone at 33.5'
-						1		
35	35.0 35.3	0.3	SS-1	50/4	_ Limestone Fragments	-1	$\top$	
7.9	55.0	<u> </u>		(50/4")	\35.0-35.3'	力		
-					Begin Rock Coring at 35.0 ft bgs See the next sheet for the rock core log	1		]
					200 the flext sheet for the rook objector	1		
						1		]
						1		]
						1		
						1		]
						]		
						]		
40								
I	l		1			1		



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SHEET 3 OF 7

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723191.2 N, 458083.4 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, SW/HW casing ORIENTATION : Vertical

WATER	LEVELS : 4.0	ft bgs		/13/07 START: 6/13/2007 END: 6/		LOGGER : C. Sump	
				DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES T	DESCRIPTION	5070	ROCK TYPE, COLOR,	AND DEPTH OF CASING,
H BE	E RU STH, OVEF	(%) O	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC	WEATHERING, HARDNESS,	OSS, CORING RATE AND OTHNESS, CAVING ROD
EVEN EVEN	CORE	ROL	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME	AND ROCK MASS CHARACTERISTICS	S, TEST RESULTS, ETC.
	35.0 R0-NQ			35.0-36.0' - Fracture zone, limestone			rock core at 35.0'; 6"
-	1 ft 36.0 100%	0	>10	fragments	+	35.0-36.0' - Same as 36.0-37.6' casing	installed from -
-	36.0 100 /6			36.0-36.1' - Fracture zone, limestone	F	<b>Limestone</b> casing	e to 10.0', HW to 35.0'
-			3	fragments 36.1' - Fracture, horizontal, rough, undulating,	Ħ	36.0-37.6' - light olive gray, (5Y 5/2), moderate HCl reaction, medium	ninute – core discarded
_			>10	slight clayey infill in fossil mold on surface	Ħ	strong (R3), 10-15% small (1/16"	_
_				36.8' - Fracture or mechanical break, 70 deg, rough, undulating to semi-planar, slightly	Ħ	diameter) void space across surface, fossiliferous (many more molds than	-
_	R1-NQ	•		radiused	$\vdash$	casts), few larger cavities (up to 3/8"	-
_	5 ft 32%	9		36.9' - Fracture or mechanical break, horizontal, rough, undulating	$\vdash$	diameter) No Recovery 37.6-41.0'	=
			NR	37.2' - Mechanical break, vertical, non-planar, spall			
40				37.5-37.6' - Fracture zone, limestone	Ш	_	
2.9				fragments	Т	R1: 4 n	ninutes -
_	41.0			4404000		0114 0 14011	_
-			0	41.0-43.0' - Compacted silty sand (carbonate derived)		Silty Sand (SM) 41.0-43.0' - moderate yellowish	=
_					4	brown, (10YR 5/4), fine grained, moderate HCl reaction, compacted,	-
_			0	-	-	carbonate derived, preferentially	3.0' More competent
-	R2-NQ			43.0. 43.1. 43.2. 43.3' - Fractures or		organic inclusions and laminations	ne beds with softer –
_	5 ft	20	5	mechanical break (4), horizontal, rough,	F	\(roughly horizontal), friable / compa	cted silt material in _
-	70%		1	undulating 44.0' - Fracture, >60 deg, rough, undulating,	Ħ	Limestone 43.0-44.5' - grayish orange, (10YR	=
45				non-planar 44.3' - Fracture, horizontal, rough, with sand	Ħ	7/4), moderate HCl reaction, weak to medium strong (R2 to R3),	-
-2.1			NR	on surface (possible thin interbed)		fossiliferous (more molds than R2: 3 n	minutes
_	46.0				世	casts), voids over 10% of surface (60% smaller than 1/16"; 40% up to	=
_	10.0			46.2.46.5.46.0.47.41. Experience (4) verien	$\vdash$	3/8" fossil molds), inclusions up to	_
_			3	46.3, 46.5, 46.8, 47.4' - Fractures (4), rough, undulating, mostly horizontal	$\vdash$	1/4" light gray (N7) (fossil infilling) No Recovery 44.5-46.0'	=
			1			Limestone 46.0-49.1' - grayish orange, (10YR	
			'		Ш	5/4), moderate HCl reaction, very	collected at 47.4-
_	R3-NQ 5 ft	34	>10		上	weak to weak (R1 to R2), easily broken by hand, void space across	_
_	62%	٠,	- 10	48.5-49.1' - Fractures (2), 75 deg, rough, undulating	口	surface 15-20%, (80% smaller than 1/16", 20% larger cavities up to 1"	_
-					上	diameter, fossiliferous (many more	=
50 -7.1			NR	_	$\vdash$	molds than casts), thin black organic laminae at 48.5-49.1'	minutes
'' -					$\vdash$	No Recovery 49.1-51.0'	- InitialC3
-	51.0				F	Limestone	-
-			2		Ħ	51.0-56.0' - moderate yellowish	=
-				51.7, 51.9' - Mechanical break, horizontal, rough, undulating to semi-planar	岸	brown, (10YR 5/4), mild to moderate HCl reaction, weak (R2), silty, finely	=
-			3	52.1, 52.3, 52.9, 53.2, 53.4, 53.9' - Fractures (6), 30-40 deg, rough, undulating to	Ħ	laminated with dark black thin (<1/16") organic laminations,	-
-	R4-NQ			semi-planar	世	undulating non-planar bedding	-
-	5 ft 100%	62	3		$\vdash$	planes	=
-	10070				$\coprod$		-
55			0	-	Н		=
					1		
					1		



### **ROCK CORE LOG**

SHEET 4 OF 7

ORIENTATION: Vertical

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723191.2 N, 458083.4 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, SW/HW casing

-				MENT : Diethor B-50 5/14 252, mad rotary, 140 tools, 544/			ORIENTATION: Vertical
WATER	LEVELS: 4.0	ft bg	s on 6	/13/07 START : 6/13/2007 END : 6/	14/20	07 LOGGER : C. Sump	
>	-			DISCONTINUITIES	ניז	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		Ś	DESCRIPTION	F00	ROCK TYPE, COLOR,	
ᇤ织흔	E, A	(%	뿔		의	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
±Ã.∀	# F 50	(%) Q	P.S.	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BO	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
	었다.	R Q	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-12.1	014				- O		R4: 5 minutes
-12.1			3	55.1' - Fracture, 60 deg, rough, semi planar		<del>-</del>	R4. 5 minutes
	56.0		ਁ	slightly radiused 55.5' - Fracture, rough, undulating			
I -				55.9' - Bedding plane, horizontal, smooth,	Н	Limestone	1
-			3	parting along organic laminae	Ė	- 56.0-56.5' - moderate yellowish	1
-	-			56.5, 56.8' - Fractures (2), rough, undulating	+	brown, (10YR 5/4), 10-15% voids cover surface, few voids/cavities	
l -			1	56.9' - Bedding plane, horizontal, smooth, 1/4" thick black organic (lignite) laminae	$\perp$	- >3/16"	_
			'	57.8-59.5' - Fracture zone, limestone		56.5-56.9' - moderate yellowish	
	R5-NQ			fragments	$\vdash$	brown to dark yellowish brown,	
-	5 ft 70%	25	>10		ш	<ul> <li>(10YR 5/4 to 10YR 4/2), very weak</li> <li>(R1), silt material with black laminar</li> </ul>	1
-	7070		>10		+	inclusions (organics, possibly lignite)	1
-			>10			<ul> <li>56.9-59.5' - moderate yellowish</li> </ul>	]
60				_	₽	brown, (10YR 5/4), mild to moderate	l
-17.1			NR			HCI reaction, very weak (R1), small voids (<1/16") occurring in irregular	R5: 4 minutes
I -	61.0				$\vdash$	zones (possible bioturbation), thin	
-	01.0				╁	zones containing fine black laminae	1
-			1	61.3, 62.15, 62.25' - Fractures or mechanical	╨	(organics), slightly friable	1
_				break (3), 30-60 deg, rough, undulating	╁┰	No Recovery 59.5-61.0' Limestone	-
I _			3			61.0-65.7' - moderate yellowish	_
			ਁ	62.75' Eractura barizantal raugh		brown to dusky yellow, (10YR 5/4 to	
	R6-NQ			62.75' - Fracture, horizontal, rough, undulating		5Y 6/4), mild to moderate HCl	1
-	5 ft	46	1	63.0, 64.1' - Fractures (2), >80 deg, rough,	1	reaction, medium strong (R3), variable (5-15%) small (<1/16") voids	1
-	94%			undulating to semi-planar, open		across surface, thin silt zones	1
-			1	64.4-64.5' - Carbonate sand interbed	$\perp$	_ (1"-1-1/2" thick) at 62.3' and 64.6'	-
65				_	Н		_
-22.1			4	65.0, 65.2, 65.35, 65.7' - Fractures (4),			R6: 5 minutes
I -	66.0		NR	horizontal, rough, undulating to planar	╁	No Recovery 65.7-66.0'	
-	00.0		1411			Limestone	1
-			1	66.35' - Fracture, horizontal, rough	+	66.0-67.0' - dusky yellow, (5Y 6/4),	1
_				27.01.5		fine grained, weak (R2), fossiliferous,	-
<u> </u>			1	67.0' - Fracture or mechanical break, rough, stepped	$oldsymbol{oldsymbol{eta}}$	silty, 5-10% small voids (<1/16") over - surface	
			'	Sieppeu		67.0-68.7' - dusky yellow to moderate	
-	R7-NQ			68.0' - Fracture, >80 deg, rough, undulating	1	yellowish brown, (5Y 6/4 to 10YR	Possible bioturbation
-	5 ft	74	3	to semi-planar	1	- 5/4), intermingled zones of fine	1 1
-	96%		$\vdash$	0041.5	oxdamma	grained silty limestone (no voids) and limestone with 20-25% small voids	-
-			4	69.1' - Fracture, 45 deg, rough, undulating to planar	+	- (1/16" - 1/8")	1 4
70				69.1-70.5' - Fracture, vertical, undulating, —	$\Box$	68.7-70.5' - weak (R2), very finely	
-27.1			2	tight (possibly healed)	$\vdash$	laminated (1/16"-1/8"), silty, with	R7: 3 minutes
	71.0			69.7, 69.9, 70.1, 70.5' - Fractures (4),	Ш	<ul> <li>sparse inclusions of void rich (20-25%) limestone preferentially</li> </ul>	1
-	7 1.0		NR	horizontal, rough, undulating, (possible bedding planes)	+	oriented parallel to bedding planes	Start drilling 6/14/07 at
1 -			1	Dodding planes)		- 70.5-70.8' - grayish yellow, (5Y 8/4),	08:00, depth at 71.0'
-				71.8, 73.5, 74.1, 74.3' - Mechanical break (4),	$oldsymbol{oldsymbol{\sqcup}}$	medium strong (R3), fossiliferous, 15% small voids (<1/16")	Water level 3.9' below
I _			0	rough, undulating, irregular		No Recovery 70.8-71.0'	ground surface
							]
1 -	R8-NQ				1-	=	1
-	5 ft	62	1		口	-	1
-	96%		<u> </u>		+	-	-
-			3	7451 5 4 300 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		  -	1 4
75			Ľ	74.5' - Fracture, >80 deg, non-planar (spall)	$oldsymbol{L}$		
			1		1		



338884.FL A-22A

SHEET 5 OF 7

ORIENTATION : Vertical

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723191.2 N, 458083.4 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, SW/HW casing

DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS  THICKNESS, SURF	DEPTH OF CASING, S, CORING RATE AND NESS, CAVING ROD EST RESULTS, ETC.
-32.1  2 75.0' - Clay seam, 1/2" silty clay interbed, dark brown/black organics  76.0  NR  75.7' - Mechanical break, rough, undulating, irregular  76.2' - Fracture, >60 deg, rough, undulating, irregular, tight (healed)  >10  77.4' - Fracture, 60 deg, slightly rough,  >10	S, CORING RATE AND NESS, CAVING ROD EST RESULTS, ETC.
-32.1  2 75.0' - Clay seam, 1/2" silty clay interbed, dark brown/black organics  76.0  NR  75.7' - Mechanical break, rough, undulating, irregular  76.2' - Fracture, >60 deg, rough, undulating, irregular, tight (healed)  >10  77.4' - Fracture, 60 deg, slightly rough,  >10	NESS, CAVING ROD EST RESULTS, ETC.
-32.1  2 75.0' - Clay seam, 1/2" silty clay interbed, dark brown/black organics  76.0  NR  75.7' - Mechanical break, rough, undulating, irregular  76.2' - Fracture, >60 deg, rough, undulating, irregular, tight (healed)  >10  77.4' - Fracture, 60 deg, slightly rough,  >10	
-32.1  2 75.0' - Clay seam, 1/2" silty clay interbed, dark brown/black organics  76.0  NR  75.7' - Mechanical break, rough, undulating, irregular  76.2' - Fracture, >60 deg, rough, undulating, irregular, tight (healed)  >10  77.4' - Fracture, 60 deg, slightly rough,  >10	- - - -
76.0  NR  75.7' - Mechanical break, rough, undulating, irregular  76.2' - Fracture, >60 deg, rough, undulating, irregular, tight (healed)  >10  77.4' - Fracture, 60 deg, slightly rough,  >10  77.4' - Fracture, 60 deg, slightly rough,	- - - -
irregular 76.2' - Fracture, >60 deg, rough, undulating, irregular, tight (healed)  1 77.4' - Fracture, 60 deg, slightly rough, or space over surface varies from 10-25% (60-70% small voids <1/16" with remainder ranging from 3/16" to >3/4"), fossilierous (many more product the process) void significance of the process of	- - -
irregular, tight (healed)  10-25% (60-70% small voids <1/16" with remainder ranging from 3/16" to >10  77.4' - Fracture, 60 deg, slightly rough, - 3/4"), fossiliferous (many more	-
>10   77.4' - Fracture, 60 deg, slightly rough,   -   - >3/4"), fossiliferous (many more	=
	=
- 5 ft   26   >10   fragments   -   larger (1") cavity, fine grained silty	_
80% zone (no voids) 73.5-73.7', 1/2" thick organic rich black clay seam at 75.0'	-
>10   fragments, dark brownish black coating on   No Recovery 75.8-76.0	_
one fragment, greasy luster on surface, tacky 76.0-80.0' - Same as 71.0-75.8' (organics).	ıtes
NR 79.8' - Clay seam, 1/2" clay infilling, dark except fractured/fragment zones associated with higher percentage of brownish black, greasy luster, tacky	_
small voids/cavities (fossil molds), (organics)	_
SC-2 collect	cted at 81.6-
81.6' - Mechanical break, horizontal, rough, undulating 0	_
81.0-85.2 - moderate yellowish	=
- 5 ft   54   0   - reaction, medium strong (R3),	_
fossiliferous (many more molds than casts), 10-15% small voids covering	_
2 84 5 84 7' - Fracture >70 deg rough   Surface (90% are <17/6°, 10% are	-
0 semi-planar   R10: 7 min	nutes
No Recovery 85.2-86.0'	-
86.1, 86.2, 86.3, 86.5, 86.7' - Fractures (5), Limestone	_
5 60-70 deg, rough, undulating to semi-planar, irregular, conjugate sets 86.0-88.7' - Same as 81.0-85.2' except strong (R4), increased	
percentage of voids and small (<3/8")	
87.5-88.7' - Fracture zone, rough, ilmestone limestone lense at 88.5-88.7'	_
R11-NQ >10	_
No Recovery 88.7-91.0'	=
	-
90 -47.1   NR   R11: 6 min	nutes
	emark: 50% loss
Limestone	on at 90.0-91.0' -
5 91.3' - Fracture, 60 deg, rough, undulating to 91.0-91.8' - moderate olive brown, semi-planar (5Y 4/4), fine grained, mild to	_
91.5' - Fracture, horizontal, rough, undulating moderate HCl reaction, strong to yery strong (R4 to R5), dense, no	_
rough, undulating, irregular voids	-1-1-1-1001
5ft   18   2   deg, rough, undulating and planar to   1   4   1   1   1   1   1   1   1   1	cted at 93.4 - -
68% semi-planar, irregular 93.4' - Fracture zone, irregular, with	=
limestone fragments -	=
95	



PROJECT NUMBER:

33884.FL

BORING NUMBER:

A-22A

SHEET 6 OF 7

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723191.2 N, 458083.4 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, SW/HW casing ORIENTATION : Vertical

WATER	LEVELS : 4.0	) ft bg:	s on 6/	13/07 START : 6/13/2007 END : 6/	14/200	7 LOGGER : C. Sump	
30₽	<u> </u>			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
THB	GTH GOVE	(%) Q	CTU	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BOL	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR	RES	R Q	FRA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-52.1			NR		$\Box$	Limestone	R12: 4 minutes
-	96.0				Ш	<ul> <li>91.8-94.4' - pale yellowish brown,</li> <li>(10YR 6/2), medium strong (R3),</li> </ul>	-
			>10	96.0-97.4' - Fracture zone, limestone fragments	Ш	10-15% small voids covering surface - (<1/16"), few larger cavities infilled	
l _				nagnicinis	団	with fine grained yellowish gray (5Y	_
-			>10	,		7/2) material, marbled zone of yellowish brown void-rich limestone	_
-	D42 NO				oxdot	with yellowish gray fine grained voidless limestone 94.0-94.4'	-
-	R13-NG 5 ft	0			╂┯╂	- (possible breccia)	=
-	28%		NR		$\overline{\mathbf{H}}$	No Recovery 94.4-96.0' Limestone	-
100					$\Box$	<ul> <li>96.0-97.4' - pale yellowish brown, (10YR 6/2), mild to moderate HCl</li> </ul>	-
-57.1				_		reaction, medium strong (R3),	R13: 3 minutes
-	101.0				Ħ	15-20% small voids covering surface (90% are voids <1/16", 10% are	-
-			-10	101.0-102.5' - Fracture zone, limestone		larger voids [3/16" - 3/4"]), fossiliferous (many more molds than	_
			>10	fragments with irregular non-planar surfaces	耳	casts)	
_			>10			No Recovery 97.4-101.0' Limestone	_
-	544340		2	102.5' - Fracture or mechanical break, 45 deg, rough, undulating, irregular	$\bot$	101.0-104.2' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4),	=
-	R14-NQ 5 ft	40		103.4' - Fracture, 45 deg, rough, stepped,	丗	moderate to mild HCl reaction.	-
-	64%		0	irregular	出	medium strong (R3), fossiliferous (many more molds than casts),	-
405					Ш	_ 10-15% small voids (<1/16") over surface, variable larger voids/cavities	-
105 <u> </u>			NR	_	₩	(fossil molds) 3/16" to >3/4" diameter, larger cavities comprise up	R14: 3 minutes
-	106.0				╁┼	to 25% volume from 101.6-102.5'	-
_					$\mathbb{H}$	<ul> <li>decreasing with depth</li> <li>No Recovery 104.2-106.0'</li> </ul>	_
			1	106.6, 107.1, 107.3' - Fractures or	Ш	Limestone 106.0-111.0' - Same as 101.0-104.2'	
_			3	mechanical break (3), 60-70 deg, rough, undulating to semi-planar, slightly radiused	Ш	except few voids/cavities greater	_
l -				107.7' - Fracture or mechanical break, low	口	than 3/16" -	_
-	R15-NQ 5 ft	48	1	angle, undulating	$\Box$	_	=
-	100%			108.7, 109.1, 109.5, 109.6, 109.9, 110.0' - Fractures or mechanical break (6), rough,	口	-	-
-			4	undulating, irregular	口	-	-
110 <u></u> -67.1				_	丗	<del></del>	R15: 5 minutes
-	111.0		1		団	-	-
-	111.0		. 40	111.0-113.7' - Fracture zone, rough,	団	111.0-113.7' - Same as 106.0-111.0'	-
_			>10	undulating, limestone fragments, irregular	Ш	<ul> <li>except variable percentage of voids</li> <li>(&lt;10-20%), thin zone of yellowish</li> </ul>	
			>10		$\mathbb{H}$	gray (5Y 7/2) fine-grained limestone at 111.8-112.0'	
_	_		- 10			-	_
-	R16-NC 5 ft	0	>10		$\square$	_	_
-	54%				H	No Recovery 113.7-116.0'	-
-					$\Box$	_	-
115			NR		$\exists$		_



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	A-22A	SHEET	7	OF	7	

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723191.2 N, 458083.4 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, SW/HW casing ORIENTATION : Vertical

CORING	INE THOU A	אם בנ	אורוע	/IENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, SW/	HVV C	asing	ORIENTATION : Vertical
WATER	LEVELS : 4.0	) ft bas	s on 6/	/13/07 START : 6/13/2007 END : 6/	14/200	D7 LOGGER : C. Sump	
		, it by	011 0/	DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	(%				FOG	LITHOLOGY	COIVIIVIENTS
N A S	2N ≻		ES_	DESCRIPTION	12	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
쁄병은	12. H	(%) Q	뀌	DEDTH TYPE OBJECTATION BOLIOURESS	1 ≒ 1	MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
F A A	SE I	0	CT.	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	₩ W	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
	CORE RUN, LENGTH, AND RECOVERY (%)	A Q	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-72.1	034			·	, o,		D40: 0 i t
-/2.1					Н		R16: 3 minutes
	116.0					Limestone	
-	110.0			<del> </del>		- 116.0-116.7' - Same as 111.0-113.7'	-
_			3	116.3, 116.7, 116.8' - Fractures (3),	Н	except increasing percentage	-
			•	horizontal, rough, undulating, irrègular	Н	voids/cavities 3/16"-3/4" in size (up to 10% of surface), notable infilling and	
				117.0' - Bedding plane or fracture, horizontal,		recrystallization in fossil molds	<u> </u>
-	-		2	smooth, planar -	ш	116.7-117.25' - moderate yellowish	-
_				117.25' - Sharp horizontal contact with light	Н	- brown, with pronounced bedding	_
	R17-NQ		1	gray, fine grained limestone		plane laminations, fine sand particles	
_	5 ft 58%	34	'	117.8' - Contact with fossil and void rich - moderate yellowish brown limestone	Ш	in fracture surface	1
-	30 /6			Thoderate yellowish brown limestone	$\vdash$	<ul> <li>117.25-117.8' - light gray, (N7), fine</li> </ul>	-
_				_	$\vdash$ $\vdash$	grained, strong (R4), dense, no voids	_
120			ND			117.8-118.9' - Same as 111.0-113.7'	R17: 4 minutes
-77.1			NR		Ш	except large 1" fossil cast at end of core	
-	-			-	+	No Recovery 118.9-121.0'	Total depth 121.0'
l _	121.0						Total deptil 121.0
						Bottom of Boring at 121.0 ft bgs on	
-	1			-	1	- 6/14/2007	<b> </b>
-	-			-	1 1	_	-
l _				_		_	_
-	-			-	1	-	-
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-23	SHEET	1	OF	13

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 0.5 ft b	gs on 4/10	0/07	START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
				(N)	
40.8	0.0			1-2-2	Poorly Graded Sand With Organics (SP)
l _		0.8	SS-1	(4)	Poorly Graded Sand (SP)
l _	1.5			, ,	\ 0.1-0.75' - grayish black grading to medium gray, (N2 / to N5), moist, very loose, fine grained, trace
l _					\nonplastic fines, organics
l _					
<u> </u>					<b>]</b>
					] [
_					1
5	5.0				1
35.8					Clayey Sand (SC)
-		0.5	SS-2	2-3-3 (6)	5.0-5.4' - greenish gray, (5G 6/1), moist, loose, fine grained, 40% fines, medium to high plasticity, silica
-	6.5			(0)	\\sand \/ -
-					Silty Sand (SM) 5.4-5.5' - yellowish gray, (5Y 7/2), moist, loose, fine to
-					medium grained, 20% fines, strong HCl reaction,
-					nonplastic fines, carbonate material
-					<b>†  </b>
-					<b>†  </b>
-					<b>†  </b>
10	10.0				<b>1</b>
30.8	10.0				Silt And Limestone (ML)
-		1.0	SS-3	10-9-5	10.0-11.0' - very pale orange, light olive brown to light yellow, (10YR 8/4, 5Y 5/6 to 5Y 7/6), wet, stiff,
-	11.5			(14)	moderate HCI reaction, nonplastic, carbonate;
-	11.5				\20-25% limestone fragments, fine to coarse   -   End drilling at 11.5' on 4/9/07
-					Resume drilling 4/10/07 water level is 0.5' below ground surface (start)
-					
-					
-					
-					Driller's Remark: hard drilling from 14-15.0',
	45.0				- Limestone rock fragments in cuttings
15 <u> </u>	15.0				Silt (ML)
-		1.1	SS-4	10-11-14	15.0-16.05' - very pale orange, (10YR 8/2), wet, very
-	46-	''	00-4	(25)	stiff, rapid dilatancy, moderate HCl reaction,
-	16.5				\gravel-sized / -
-					-
-					-
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PROJECT NUMBER:	BORING NUMBER:					
338884 FI	Δ-23	SHEET	2	OF	13	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 0.5 ft bo	gs on 4/10	0/07 5	START: 4/9/2007 END: 4/17/2007 LOGGER: R. McComb, C. Dougherty
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
20.8	20.0			( )	Silt With Sand (ML)
-	:	0.9	SS-5	13-17-16 (33)	20.0-20.9' - very pale orange, (10YR 8/2), moist to wet, hard, rapid dilatancy, mild to moderate HCl
1 ]	21.5			(66)	reaction, 20% fine to medium grained sand, / nonplastic, all carbonate
_					
-					
-	-				
-	_				
-	_				
25	25.0				†
15.8	20.0				Sandy Silt (ML)
		0.9	SS-6	19-24-11 (35)	25.0-25.9 - Same as 20.0-20.9' except up to 38% sand-sized grains with carbonate material
_	26.5			()	
-	-				
-					
-					
-					
-	-				†
30	30.0				1.1
10.8				8-22-35	Silt With Sand (ML) 30.0-31.4' - moderate yellow, (5Y 7/6), wet, hard,
-		1.4	SS-7	(57)	15-20% sand, nonplastic to low plasticity, rapid dilatancy, moderate HCl reaction, <1/16" thick calcite
-	31.5				stringers, all carbonate
-					
-					<u> </u>
-	-				1 1
					]
-	25.0				] ]
35 5.8	35.0 35.2	0.1	SS-8	50/2	Limestone Fragments
-	55.2			(100")	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
-	-				Begin Rock Coring at 35.0 ft bgs See the next sheet for the rock core log
-	-				See the next sheet for the rock core log
-	1				
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PROJECT NUMBER:

33884.FL

BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 0.5	ft bgs	s on 4/	10/07 START : 4/9/2007 END : 4	/17/2	007	LOGGER: R. McComb, C. Doug	herty
30₽	<u>(%</u>			DISCONTINUITIES	_ <b>_</b>   g	Ł	LITHOLOGY	COMMENTS
RELO' CE AN TION (f	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION			ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
DEPTH BELOW SURFACE AND ELEVATION (ft)				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG			
5.8 -	35.0 R1-HQ 5 ft 68%	51	>10	35.4-36.0' - Fracture zone, rough, stepped,	H	Ŧ	Limestone  35.0-38.4' - pale yellowish brown, (10YR 6/2), fine grained, mild to moderate HCI reaction, very weak (R1), voids <1/16" over 10-30% of surface (becoming more numerous with depth), shallow cavities covering <1% (1/16"-1/8"x3/8"), high angle (60-70 degrees) unbroken fracture zone from 37.7-38.0'	Change to HQ rock coring at 35.0' on 4/10/07 at 10:00 - hours
-			0	vertical fracture, limestone fragments on top, various orientation	Ē	1		
-			1	00 41 Frankers F0 day south standard		‡		
_			0		上	⇟		
-			NR	38.4' - Fracture, 50 deg, rough, stepped, open	占	+	No Recovery 38.4-40.0'	R1: 9 minutes
40	40.0				$\Box$	Ī		-
0.8	R2-HQ 5 ft 68%	0	NA	_	-	-	Silt (ML) 40.0-43.4' - dusky yellow, (5Y 6/4), wet, soft, rapid dilatancy, mild HCl reaction, sandy, carbonate material	- - - -
- - -					- -	  -  -	No Recovery 43.4-45.0'	- - -
- - 45	45.0		NR		- -	  -	ŕ	R2: 3 minutes
-4.2 -			2	45.2' - Fractures, rough, stepped, open	H	Ŧ	Limestone  45.0-46.0' - dusky yellow, (5Y 6/4), fine grained, mild HCI reaction, extremely weak (R0), voids <1/16" over 15-20% of surface, cavities up to 3/16"x3/16", trace mold/ casts  Silt With Sand (ML)  46.0-48.2' - dusky yellow, (5Y 6/4), wet, soft to stiff, fine grained, 15-20% sand, rapid dilatancy  No Recovery 48.2-50.0'	-
-	R3-HQ 5 ft 64% 50.0	13	0	45.9' - Fractures, rough, planar, open	$\prod$	F		-
_			0		-	F		- -
-			0			F		
- - 50			NR			F		R3: 6 minutes
-9.2 -	00.0		>10	50.0-50.45' - Fracture zone 50.45' - Fracture zone, 30 deg, rough,	#	‡	Limestone 50.0-50.45' - Same as 46.0-48.2' except with some limestone	-
-	R4-HQ 5 ft 26%		>10	undulating, open 51.0' - Fracture zone, 60 deg, rough,	F	+	fragments	-
-		9	NR	undulating, open 51.3-55.0' - Fracture zone, 80-90 degrees, black organic material covering up to 40-50% of some surface	Ē	1	50.45-51.3' - light olive brown, dusky yellow, (5Y 5/6 to 5Y 6/4), fine grained, mild to moderate HCl reaction, very weak (R1), laminated	- -
-					H	<b>F</b>	black organic material from 50.9-51.3', voids <1/16" over 5-10% of surface No Recovery 51.3-55.0'	-
-					$\frac{1}{1}$	$\pm$		R4: 12 minutes
55	55.0				上	1		_
						_		



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 0.5	ft bgs	s on 4/	10/07 START: 4/9/2007 END: 4/	17/20	D7 LOGGER: R. McComb, C. Doug	herty
<b>≩</b> □ <i>⊋</i>	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
ELO ON (f	ANG RY (6	_	ZES JT	DESCRIPTION	O LC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B	E RU GTH, OVE	R Q D (%)	CTUI	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	S O	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-14.2					ш	Limestone	
			1	55.6' - Fractures, 0- <5 deg, rough, stepped,	ш	<ul> <li>55.0-59.5' - dusky yellow to light olive brown, (5Y 6/4 to 5Y 5/6), fine</li> </ul>	1
			_	open 56.2' - Fractures, horizontal, rough, stepped,	Ш	grained, mild HCl reaction, extremely	1
			3	open	Н	<ul> <li>weak to very weak (R0 to R1), extremely weak rock is friable, voids</li> </ul>	]
	R5-HQ 5 ft	30	2	56.65-56.95' - Fractures, <5 deg, rough, stepped, open	$\vdash$	<1/16" over 3-5% of surface, interval of black carbonaceous laminae up to	
_	100%	00		57.1' - Fractures, 20-0 deg, rough, stepped 57.85-58.1' - Fractures, <5 deg, rough,		3/4" thick	]
_			2	stepped, open		<del>-</del>	
_				58.5-58.8' - Fracture zone, 50 deg, rough, stepped, open	H	-	DE 0 minutos
_			0	59.4' - Fracture, 50 deg, rough, stepped,	H	50 5 60 0' yellowish gray (5V 7/2)	R5: 8 minutes
60 <u> </u>	60.0			open	Ш	59.5-60.0' - yellowish gray, (5Y 7/2), — very fine to fine grained, mild to	-
			1	CO CL Franking rough street delega-	Н	moderate HCl reaction, weak (R2), voids (<3/16") over 10-15% of	-
-				60.6' - Fracture, rough, stepped, planar, open	+	<ul> <li>surface, weak vertical fractures from</li> </ul>	-
_			>10	61.2-61.8' - Fracture zone, stepped, undulating, open	H	59.5-60.0', mottled 60.0-65.0' - yellowish gray, (5Y 7/2),	-
_	R6-HQ				ш	<ul> <li>fine grained, mild HCl reaction, extremely weak to very weak (R0 to</li> </ul>	-
-	5 ft 100%	38	2	62.35' - Fractures, 50 deg, rough, undulating,	ш	R1), voids (<3/16") over 10-15% of	-
_	10070			tight 62.8' - Fractures, <5 deg, rough, undulating,	Ш	<ul> <li>surface becoming &lt;1% at 63.0', fossils (casts/molds) rare to absent</li> </ul>	-
-			2	open 63.4' - 30 deg, rough, undulating, open		with depth, trace black organic	1
_				63.9 - 64.0' - Fracture zone, horizontal,	$\mathbb{H}$	naterial at 61.0'	R6: 7 minutes
65	65.0		1	rough, stepped, undulating, open	H	_	1
-24.2			4	65.3' - Fractures, rough, stepped, open		65.0-66.9' - dusky yellow, (5Y 6/4), fine grained, mild to moderate HCl	R7: 3 minutes
_			_	65.5' - Fractures, horizontal, smooth, planar,		reaction, very weak to extremely	
_			>10	open 65.65-66.02' - Fracture zone, horizontal,		weak (R1 to R0), voids <10% of surface becoming more common	
_	57.110			rough, undulating, open 66.25-66.9' - Fracture zone, 0- 90 deg, rough,	Н	with depth, very friable from	
_	R7-NQ 5 ft	20	2	undulating, various orientations	Ш	56.3-66.9' - 66.9-70.0' - yellowish gray, (5Y 7/2),	-
_	100%			67.35' - Fractures, 50 deg, rough, stepped, open	Н	mild to moderate HCl reaction, weak (R2), very fine grained, fine grained	
-			10	67.60-68.5" - Fracture zone, 50-90 deg,	П	<ul><li>matrix, voids (&lt;1/16") over 15-20% of</li></ul>	-
-				rough, undulating, open 68.9' - Fractures, 0-80 deg, rough, undulating	囯	surface, <5 cavities (3/8" diameter), bioturbation zone below 68.4'	SC-1 collected at 68.9-
	70.0		0		口	-	70.0'
70 <u> </u>	70.0			70.0-71.05' - Fracture zone, 60 deg, rough,	世	70.0-70.4' - yellowish gray, (5Y 7/2),	-
-			>10	undulating to stepped, open	郉	fine grained, mild HCl reaction, very weak (R1), voids <1/16" over 10-15%	1 1
-					Ħ	of surface, trace fossil molds/casts	
_			1		H	Silt (ML) 70.4-70.65' - yellowish gray, (5Y 7/2),	1
	R8-HQ	00		72.0' - Fractures, rough, undulating to	$\parallel$	wet, soft, rapid dilatancy, mild HCI	SC-2 collected at 71.05-
	5 ft 96%	26	4	stepped, open 72.5' - Fractures, horizontal and 70 deg,	片	reaction Limestone	72.0' -
			>10	rough, stepped, open 72.7' - Fractures, horizontal, rough, stepped,	H	70.65-72.5' - yellowish gray, (5Y 7/2),	]
			- 10	open	$\square$	fine grained, mild HCl reaction, very weak (R1), voids <1/16" over 10-15%	]
_			>10	72.8' - Fractures, 60 deg, rough, stepped, open	Щ	of surface, trace fossil molds/casts 72.5-73.5' - Same as 70.0-70.4'	R8: 7 minutes
75	75.0				Щ	except voids 5-10% of surface	
$\overline{}$							



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 0.5	ft bgs	s on 4/	10/07 START : 4/9/2007 END : 4	/17/20	17 LOGGER : R. McComb, C. Doug	herty
≥D≎	(%			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-34.2 - - - - - - -	R9-HQ 5 ft 100%	64	0 2 10 2	73.2-75.5' - Fracture zone, 60 deg, rough, stepped, open 73.5-75.0' - Fracture zone, various orientations 75.0-75.3' - Fracture zone, horizontal, rough, undulating, open 75.3' - Fractures, horizontal, rough, undulating, open 75.9' - Fractures, <5 deg, rough, undulating, open 77.45' - Fractures, <5 deg, rough, stepped, open 77.7' - Fractures, 60 deg, rough, undulating, tight 78.0-79.0' - Fractures, 60 deg, rough,		Limestone  73.5-74.8' - yellowish gray, (5Y 7/2), mild HCl reaction, extremely weak (R0), highly fractured, friable, silt and clay along fracture planes and on fragments of rock  No Recovery 74.8-75.0'  Limestone  75.0-76.4' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), friable along fracture planes, voids <3/16" over 50-60% of surface, 1-2 cavities (3/16"X3/16")	R9: 4 minutes
80	R10-HQ 5 ft 100%	36	1 5 2 1	stepped, open 79.3-79.65' - Fractures, <5 deg, rough, stepped, open 80.1' - Fracture, <5 deg, rough, undulating, open 81.1-81.3' - Fractures, <5 deg, rough, undulating, open 81.5-81.7' - Fractures, horizontal, rough, undulating, open 81.9-82.05' - Fractures, <5 deg, rough, undulating, open 82.65' - Fractures, horizontal, rough, stepped, open 83.65' - Fracture, <5 deg, rough, undulating,		76.4-79.0' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine to very fine grained, mild HCI reaction, very weak (R1), voids <3/16" over 25% to <5% of surface (decreasing with depth), >5 cavities (3/4"-2"x3/8") and 1/16"x1/16" 79.0-79.5' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, mild HCI reaction, extremely weak (R0), fragmented 79.5-80.0' - Same as 76.4-79.0' 80.0-82.4' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2),	SC-3 collected at 82.7-83.6'
8544.2	85.0 R11-HQ 5 ft 74%	64	0 0 1 1 NR 0	open 83.8-84.7' - Fracture, 60 deg and 70 deg, rough, stepped, open 84.95' - Fractures, 60 deg, rough, stepped, open  87.25' - Fracture, rough, undulating, open, horizontal  88.15' - Fracture zone, 40 deg, rough, stepped, open		fine grained, mild HCl reaction,  extremely weak (R0), voids over  10-15% of surface, >5 cavities up to 1-3/4"x3/4"-1-3/16", interconnected  82.4-84.3' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, mild HCl reaction, very  weak (R1), voids <1/16" over 25-30% of surface, 3 to 4 cavities up to 3/8"x 3/16", trace fossils molds/casts  84.3-85.0' - Same as 82.4-84.3' except with >5 cavities (3/8"x3/8"), trace fossil molds/casts  85.0-88.2' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very weak to weak (R1 to R2), voids	Stop drilling for the day, 4/10/07 Water level 0.5' below ground surface Resume drilling on 4/11/07 Water level 0.5' below ground surface  DR: Soft at 88.2-90.0', assumed core loss from this interval R11: 6 minutes
-49.2 - - - - - - -	90.0 R12-HQ 5 ft 78%	15	>10 2 10 10 NR	90.0-94.0' - Fracture zone, gravel 90.4' - Fracture zone, 60 deg, rough, stepped, open 90.8' - Fracture zone, 0-<5 deg, rough, undulating, open 91.1' - Fractures, 60 deg, rough, stepped, open 91.5' - Fractures, 70 deg, rough, stepped, open, (7-1/5" long) from 91.3-91.9' 92.1' - Fractures, 0-90 deg, rough, stepped, open from 92.1-92.7' 92.7-92.9' - Fractures, 60 deg, rough, stepped, open 93.4-93.8' - Fractures, 0-90 deg, rough, stepped, open		<1/16" over 15-20% of surface, >3 cavities (1/16"x3/16") interconnected, trace casts/molds No Recovery 88.2-89.5' Limestone 89.5-90.0' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, extremely weak (R0), friable, gravel-sized rock fragments with carbonaceous material over 15-20% of surface	R12: 10 minutes



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 0.5	ft bg	s on 4/	10/07 START : 4/9/2007 EN	ND: 4/17/2007	7 LOGGER: R. McComb, C. Doug	herty
×0.0	. (9			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTN	ΙΞ̈́Ι	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-54.2 - - - - -	R13-HQ 5 ft 100%	82	1 0	95.4' - Fractures, horizontal, rough, stepper open 95.8' - Fractures, horizontal, rough, undulating, open 96.9' - Fracture, 50 deg, rough, stepped	ed,	Limestone 90.0-91.0' - light olive gray, (5Y 5/2), very fine grained, moderate to strong HCI reaction, medium strong (R3), voids <1% to absent, (2-3 inches) carbonaceous laminae, 1 cavity 2-3/8"x3/8", 1 cavity 3/8"x3/16" 91.0-93.9' - yellowish, (5Y 7/2), fine grained, mild HCI reaction, very weak to weak (R1 to R2), voids <1/16 over	SC-4 collected at 95.8- 96.9' -
100	100.0		10	98.5' - Fractures, 60 deg, rough, stepped, open 98.7' - Fractures, rough, undulating, vertica 98.9' - Fractures, <5 deg, rough, undulating open	al g,	25-30% of surface, several cavities (3/8"x3/8"), fragmented at bottom No Recovery 93.9-95.0' Limestone 95.0-96.9' - yellowish gray, (5Y 7/2),	R13: 9 minutes -
-59.2 - -			>10	99.15-99.4' - Fracture zone, 60-70 deg, rough, stepped 99.9-100.0' - Fracture, 60-70 deg, rough, stepped, open		very fine to fine grained, mild to moderate HCl reaction, weak (R2), cavities <3/8"x3/8" (many infilled), fine grained contains voids over 15-20% of surface, very fine grain	-
	R14-HQ 5 ft 60%	24	>10	100.0-101.0' - Fracture zone, 60-70 deg, rough, planar to undulating, open, some black carbonaceous staining 101.0-102.0' - 70-80 deg, 7-1/5"- 8-2/5" lon 102.0-103.0' - fractures resulting in	ng 🗔	rock contains less void percentage, trace fossil casts/molds. 96.9-100.0' - dusky yellow, (5Y 6/4), fine grained, very weak to weak (R1	-
-			NR	gravel-sized limestone fragments		to R2), voids <3/16" over 35-40% of surface, several cavities (1/16"x3/8"), one cavity through core, cavities more abundant with depth. 100.0-103.0' - yellowish gray to	R14: 5 minutes
10 <u>5</u> -64.2 -	105.0		3	105' - Fractures, rough, stepped, open 105.2' - Fractures, rough, planar, open 105.3' - Fractures, 50 deg, rough, stepped, open	- <del></del>	dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, mild HCI reaction, very weak (R1), voids <3/16" over 25-30% of surface, cavities (several) 3/16"x3/16", black carbonaceous	
-	R15-HQ 5 ft   98%	88	2	107.35-107.5' - Fractures, 30 deg, rough, stepped, open		laminae at 100.9' No Recovery 103.0-105.0' Limestone 105.0-109.9' - dusky yellow, (5Y 6/4), fine grained, mild to moderate HCI	107.4' -
-			0			reaction, very weak to weak (R1 to R2), voids <1/16" over 25-30% of surface becoming less abundant with depth, cavities (>5) 3/16"x3/8"	R15: 5 minutes
110 -69.2 -	110.0		(NR) 3	110.2' - Fractures, horizontal, rough, undulating, open 110.6-110.9' - Fracture zone, 70-0 deg, rough, stepped, open		No Recovery 109.9-110.0'  Limestone 110.0-115.0' - dusky yellow, (5Y 6/4), fine to very fine grained, mild HCl reaction, very weak to extremely	
-	R16-HQ 5 ft   100%	35	>10	111.0-113' - Fracture zone, horizontal, rouç undulating, open	gh,	weak (R1 to R0), becoming weaker with depth, voids <1/16" over 10-15% of surface, cavities (>5) below 114.0' (1/16"x1/8"), trace fossil mold/casts	-
-			1	113.15' - Fracture, horizontal, rough, undulating			R16: 7 minutes
115	115.0						



PROJECT NUMBER: BORING NUMBER: 338884.FL

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 0.5	ft bgs	s on 4/	10/07 START : 4/9/2007 END : 4	/17/20	D7 LOGGER: R. McComb, C. Doug	herty
>∩≎	(%			DISCONTINUITIES	၂ ပွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
	CORE LENG RECO	RQD	FRAC PER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-74.2 _			>10	115.0-116.0' - Fracture zone, horizontal, rough, stepped, open	+	Limestone 115.0-116.0' - dusky yellow, (5Y 6/4), fine grained, mild HCl reaction,	-
_			>10	116.0-118' - Fracture zone, 90-<5 deg, rough, stepped, open	Ē	extremely weak (R0), abundant cavities (>5) up to 3/4"-2"x 3/8"-3/4",	-
-	R17-HQ 5 ft	8	>10			voids over 60% of surface, fossil molds/casts - 116.0-117.4' - dusky yellow, (5Y 6/4),	-
_	66%		>10		上	fine grained, mild HCl reaction, very weak (R1), fossiliferous (molds/casts) and organized shell	]
_			NR		$\exists$	material 117.4-118.3' - light olive brown, (5Y	R17: 4 minutes
120 <u>-</u> -79.2	120.0			_		<ul> <li>5/6), fine grained, mild HCl reaction, extremely weak (R0), friable, coarse</li> <li>sand to gravel-sized fragments</li> </ul>	
			5	120.2' - Fractures, horizontal, rough, undulating, open 120.3' - Fractures, 40 deg, rough, stepped,	士	<ul> <li>No Recovery 118.3-120.0'</li> <li>Limestone</li> <li>120.0-121.6' - dusky yellow, (5Y 6/4),</li> </ul>	
-			4	open 120.5-120.65' - Fractures, horizontal, rough, stepped, open		fine grained, weak (R2), voids up to 1/16" covering 15-20%, > cavities up	-
_	R18-HQ 5 ft 82%	40	10	120.75' - Fractures, 40-60 deg, rough, stepped, open		to 3/4-1-3/16"x3/8", fossil casts/molds 121.6-121.9' - dusky yellow, (5Y 6/4),	-
-	5278		0	121.05-121.4' - Fractures, <5 deg, rough, stepped, open 121.55-121.85' - Fractures, horizontal, rough,		fine grained, weak (R2), <10% voids over surface, no cavities at 121.0' 121.9-124.1' - dusky yellow, (5Y 6/4),	SC-6 collected at 123.0- 124.1'
-			0 NR	planar, open 122.55' - Fractures, rough, stepped, open 122.8-103.0' - Fractures, horizontal, rough,	芦	fine grained, weak (R2), extremely weak (R0), at 122.6-123.0' No Recovery 124.1-125.0'	R18: 6 minutes
125_ -84.2	125.0		10	open – 124.1' - Fracture, horizontal, rough, stepped,	ፗ	Limestone - 125.0-129.0' - dusky yellow, (5Y 6/4),	_
_				open 125.4-125.85' - Fracture zone, 0-<5 deg, rough, stepped to undulating, open	Ħ	fine grained, very weak to extremely weak (R1 to R0), punctuated with	-
_	R19-HQ		3	126.1-126.7' - Fracture zone, 50 deg, rough, stepped, open 126.5-126.75' - Fractures, horizontal, rough,	Ħ	<ul> <li>thin beds up to 2-1/2" thick, fissile, very weak, (R1), laminations</li> <li>(126.5-126.5'; 126.8-127.5') mild to</li> </ul>	-
_	5 ft 80%	30	0	stepped, open	F	<ul> <li>moderate HCl reaction, voids up to 1/16" over 30-40% of surface, cavities &gt;5 (1/16"x3/16") fossiliferous</li> </ul>	-
-			2	128.35' - Fractures, 30 deg, rough, tight, undulating to stepped, clay and silt	$\blacksquare$	<ul> <li>(molds/casts) and shell material, laminated from 128.8-128.9'.</li> </ul>	
130	130.0		NR	128.75' - Fractures, 10 deg, rough, undulating, clay infilling, tight, 10% of surface <1/16" thick		No Recovery 129.0-130.0' -	R19: 6 minutes
-89. <u>2</u> -			>10	130.3-131.85' - Fracture zone, smooth, planar, open	$\exists$	Limestone - 130.0-131.5' - Same as 125.0-129.0'	]
-			10	p.aa., opon		- 131.5-131.9' - dusky yellow, (5Y 6/4),	
-	R20-HQ 5 ft	28	1	131.85' - Fractures, <5 deg, rough, stepped, open	片	<ul> <li>fine to very fine grained, punctuated with thin beds of fine grained</li> </ul>	
-	78%	-	2	132.85' - Fracture, rough, stepped, open 133.05' - Fractures, 0-90 deg, rough,		laminations with voids - 131.9-133.9' - Same as 125.0-129.0' except from 133.25-133.5 (<10%	-
-				stepped, open 133.53' - Fractures, rough, planar, open		voids) No Recovery 133.9-135.0'	R20: 7 minutes
135	135.0		NR		世	_	-
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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 0.5	ft bgs	s on 4/	10/07 START : 4/9/2007 END : 4/	17/200	7 LOGGER : R. McComb, C. Doug	herty
>00	<u>.</u>			DISCONTINUITIES	ڻ ا	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ᆱᇬ	PATA ATA	(%) <sub>Q</sub>	7. 100	DEDTH TYPE ODIENTATION POLICHNESS	<b>1</b>	MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
HAY.	RE- CO	αD	ACT R F(	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	MB(	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SU	SHR	R	FR.	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-94.2				135.1' - Fractures, 50 deg, smooth,	ш	Limestone	
-			2	undulating, open	╁┼	135.0-136.4' - dusky yellow, (5Y 6/4),	-
-				135.95' - Fractures, <5 deg, rough,	╀╫	fine grained, very weak to extremely	-
			>10	undulating, open	Ш	weak (R1 to R0), trace fine grained laminations	
			10	136' - Fracture zone, gravels	$\mathbf{H}$	136.4-139.4' - greenish gray, (5GY	
1 7	R21-HQ			136.4' - Fracture zone, 40 deg, rough,		6/1), very light gray mottled, very fine	1
-	5 ft	38	2	stepped, open 136.9' - Fracture zone, 60-70 deg, rough,	╁┷╂	grained, strong HCl reaction,	SC-7 collected at 137.25- 138.05'
-	88%			undulating, open	$\Box$	medium strong (R3), voids <3/16" over 3-5% of surface becoming more	136.05
			4	137.1' - Fractures, 50 deg, rough, undulating,		- common with depth, cavity	
			·	open	Н	1-3/16"-1-9/16", ovate shape (>5)	
			>10	137.3' - Fractures, 30 deg, rough, undulating	Ш	becomes numerous with depth, black	R21: 9 minutes
			NR	to stepped, open 138.1' - Fractures, <5 deg, rough, undulating,	╁┼	- carbonaceous material especially	-
140 <u> </u>	140.0		-::\  -::\	open — open		along fracture plane common below 138.5', HCl reaction becoming mild	-
- 55.2			10	138.45' - Fractures, 30 deg, rough, stepped,	Ш	with depth	1 4
				open, dark brown to black stain over 60-70%	Ш	No Recovery 139.4-140.0'	
				of surface 138.7' - Fractures, 80 deg, rough, stepped,		Limestone 140.0-143.1' - yellowish gray mottled	
			1	open	╁┼	with light olive gray, (5Y 7/2 with N8),	1
-	R22-HQ			138.95' - Fractures, rough, undulating, open	団	very fine grained, moderate to strong	-
-	5 ft	76	1	139.1-140.3' - Fracture zone	+	HCl reaction, weak to very weak (R2	-
1 _	100%			140.7' - Fractures, <5 deg, rough, undulating, open		to R1), interbedded/laminae of fine grained limestone, laminations from	
			,	141.7' - Fracture, horizontal, rough,		140.0-140.8' and 141.0-141.4', voids	
			1	undulating, open	Н	(<1/16") concentrated in fine grained	
-				142.4' - Fracture, <5 deg, rough, stepped,		material over 25% of surface,	R22: 9 minutes
-			5	open 143.6' - Fracture, <5 deg, smooth,	++	cavities less than <3/8", material is medium strong to strong rock (R3 to	-
145_	145.0			undulating, tight —	ш	— R4)	_
-104.2			2	144.1-144.85 - Fractures, <5 deg, rough,	Ы	143.1-145.0' - moderate olive brown,	
			-	undulating, open		(5Y 4/4), mild HCl reaction,	
				144.9' - Fractures, vertical, rough, stepped, open	Ш	<ul> <li>extremely weak (R0), friable, coarse grained from 143.1-143.6 becoming</li> </ul>	1
-			4	145.75-145.85' - Fractures, <5 deg, rough,	$\Box$	fine grained with depth, voids,	-
-	Dog LIO			undulating, open	$\Box$	- cavities over 70-80% from 143.6,	-
_	R23-HQ 5 ft	62	2	146.0-146.5' - Fractures, <5 deg, rough,	$oldsymbol{+}$	diminishing to 10-15% with depth	
	100%			undulating, open 146.9' - Fractures, rough, planar, open		145.0-145.75' - light olive gray, (5Y 5/2), very fine to fine grained, mild	
				147.3' - Fractures, <5 deg, rough, undulating,	Н	HCl reaction, very weak (R1), voids	
1 7			0	open	Ш	over 10-15% of surface, <5 cavities	1
-			$\vdash$	147.5-148.0' - Fractures, 75 deg, rough,	╙	- 3/16"x3/16"	R23: 5 minutes
-			1	undulating, tight 149.3' - Fracture, 20 deg, rough, planar, open	丗	145.75-147.3' - moderate olive brown, (5Y 4/4), mild HCl reaction,	
	150.0			149.9' - Fracture, vertical, rough, stepped,	凵	— extremely weak (R0), voids are	_
-109.2			,	open	Ш	70-80% of surface	
			3	150.3-150.7' - Fractures, smooth, planar to	Ш	147.3-150.0' - light olive gray, (5Y 5/2), very fine to fine grained, mild	SC-8 collected at 150.7-
-				undulating, light tan to dark staining over	$\mathbf{H}$	HCl reaction, very weak (R1), fossils	151.8'
-			0	20-50% surface		(casts/molds), becoming fragmented	-
-	DOLLIC				₩	at base, friable, weak (R2)	-
	R24-HQ 5 ft	42	3	152.2' - Fractures, horizontal, rough,	Ш	150.0-150.3' - light olive gray, (5Y	
	72%	.2		undulating, open	H	5/2), fine grained, mild HCl reaction, very weak (R1), voids over 10-15%	
1 7			1	152.3' - Fractures, <5 deg, rough, undulating, open	Ш	of surface	1
-			$\vdash$ $\vdash$ $\vdash$	152.4' - Fractures, 60 deg, rough, undulating,	口	-	1 1
-			<u>,                                   </u>	tight	╂┼┼	-	R24: 5 minutes
-			NR	153.3' - Fracture, 0-90 deg, rough, stepped,	口	-	
155	155.0			open	Ш		



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 0.5	ft bgs	on 4/	/10/07 START : 4/9/2007 END : 4/	17/200	DOT LOGGER: R. McComb, C. Doug	herty
≥∩≘	(9)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	TH,	(%) Q	750	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	OIR	ď	╙Δ	THICKNESS, SON ACE STAINING, AND HOTTINESS	S		
-114.2			2	155.15' - Fractures, rough, undulating, open	Ш	150.3-150.7' - moderate olive brown, - (5Y 4/4), fine grained, mild HCl	_
				155.7' - Fractures, 10 deg, smooth, planar,	ш	reaction, extremely weak (R0), very	
			2	open	ш	thick laminations (wavy), voids up to 1/16" over 20-25% of surface,	
			_	155.8' - Fractures, rough, undulating 156.03' - Fractures, rough, stepped, open	Н	linear-shaped cavities up to	
	R25-HQ		- 10	156.7' - Fractures, <5 deg, rough, undulating,		1-3/16"x3/16" - <b>Limestone</b>	
1 7	5 ft 60%	32	>10	tight 157.0-160.0' - Fracture zone, 90-0 deg,		150.7-152.2' - yellowish gray, (5Y	1
1 1				rough, open, gravel sized fragments	Ш	7/2), mottled, fine to medium grained,	1
1 1					ш	<ul> <li>mild HCl reaction, very weak to weak (R1 to R2), voids over 35% of</li> </ul>	1
			NR			surface	R25: 5 minutes
100	400.0				╁┼	<ul> <li>152.2-153.6' - light olive brown, (5Y 7/2), very weak (R1), voids over</li> </ul>	1
160 -119.2	160.0			_		25-30% of surface, cavities	-
1 -			0			<ul> <li>(3/16"x3/16"), some black organic material throughout</li> </ul>	-
-					+	No Recovery 153.6-155.0'	-
-			0		ш	Limestone	-
-	D00 110			162 Ol. Frantisco Tana reugh productionally	$\vdash$	155.0-155.4' - Same as 152.2-153.6' 155.4-156.0' - yellowish gray, (5Y	-
4	R26-HQ 5 ft	50	>10	162.0' - Fracture zone, rough, predominantly horizontal undulating to stepped, open		_ 7/2), very fine grained, strong HCI	_
	80%					reaction, weak to medium strong (R2 to R3), voids/cavities absent,	_
			10	163.3' - Fracture, rough, stepped, open,	Ш	laminated, weak/unbroken fracture	
			10	horizontal, fracture connecting 163.3-163.4'	ш	separated by overlying limestone	
			NR	163.4-163.65' - Fractures, <5 deg, undulating, smooth to rough		156.0-158.0' - light olive brown, (5Y 7/2), very weak (R1), voids over	R26: 7 minutes
165	165.0		INIX	163.7-163.85' - Fractures	$\vdash$	25-30% of surface, cavities	
-124.2			40	163.85' - Fractures, horizontal, rough, undulating, open		— (3/16"x3/16"), some black organic material throughout	
1 7			10	165.1-165.75' - Fracture zone, 0-90 deg,		No Recovery 158.0-160.0'	SC-9 collected at 165.7-
1 7				rough, undulating, open	$\vdash$	<ul> <li>Limestone 160.0-160.2' - light olive brown, (5Y</li> </ul>	167.0'
1 1			0		ш	7/2), very weak (R1), voids over	1
1 1	R27-HQ			167.0-168.3' - Fracture zone, 90-0 deg,	Ш	- 25-30% or surface, cavities (3/16"x3/16"), some black organic	1
1 1	5 ft 100%	26	>10	rough, undulating to stepped, open	Н	material throughout	1
	100 /0					<ul> <li>160.2-162.15' - yellowish gray, (5Y 7/2), mild HCl reaction, weak to</li> </ul>	
			>10	168.3' - Fracture zone, horizontal, smooth, undulating		medium strong (R2 to R3), voids	-
				168.7' - Fracture zone, vertical, stepped,	Ш	<ul> <li>&lt;1/16" over &lt;1% of surface, &lt; 5 cavities (3/16"x3/16")</li> </ul>	R27: 9 minutes
170	470.0		4	open	口	162.15-164.0' - yellowish gray to	-
170 -129.2	1/0.0			168.85' - Fracture zone, horizontal, rough, undulating, open	丗	— dusky yellow, (5Y 7/2 to 5Y 6/4), fine	-
			3	169.1-169.65' - Fractures, horizontal, rough,	+	to very fine grained, extremely weak to medium strong (R0 to R3),	-
-				undulating, open 170.1' - Fractures, <5 deg, rough, undulating,		<ul> <li>laminated, void percentage from</li> </ul>	-
-			10	open		<1% up to 30-40%, cavities (3/8"x3/16"), primarily in upper 1.0' of	-
	Dog to			170.35' - Fractures, 10 deg, smooth, planar 170.9' - Fractures, rough, undulating, open	$oxed{\square}$	section	-
	R28-HQ 5 ft	30	10	171.3' - Fractures, rough, stepped, open	Ш	No Recovery 164.0-165.0' Limestone	
	92%			171.45' - Fractures, smooth, planar, open 172.0-172.2' - Fractures, <5-90 deg, rough,	+	_ 165.0-168.0' - yellowish gray, (5Y	]
			5	undulating to stepped, open	F	7/2), fine to very fine grained, mild	]
				172.25-173.0' - Fractures, horizontal,		HCl reaction, weak to very weak (R2 to R1), voids <1/16" over 10-15% of	
]			1	intersecting angles 173.2-173.8' - Fractures, rough, undulating,	$\vdash \vdash$	surface, >5 cavities 3/8"x 1/16",	R28: 7 minutes
175	175.0		NR	vertical fracture along face of core, open		fossils (mold/cast)	1



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 0.5	ft bg	s on 4/	10/07 START : 4/9/2007 END : 4	/17/200	7 LOGGER: R. McComb, C. Doug	herty
≥D₽	(%			DISCONTINUITIES	_   g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-134.2 - - - - - - - - - 180	R29-HQ 5 ft 91%	60	1 >10 0 3 NR	173.8' - Fractures, horizontal, rough, undulating, open 173.9' - Fractures, smooth, planar, open 174.3' - Fracture, <10 deg, smooth, planar, tight, slightly inclined 175.2' - Fracture, smooth, undulating, open, sand-sized grains 176.0-177.0' - Fracture zone, 0-90 deg, undulating, smooth to rough, open 178.6-178.75' - Fractures, 10 deg, smooth, planar, tight 178.85' - Fractures, <5 deg, rough, undulating to stepped, open		168.0-170.0' - yellowish gray, (5Y - 7/2), very fine grained, weak (R2) 170.0-174.0' - yellowish gray, (5Y 7/2), light olive gray mottled, fine to very fine grained, mild HCl reaction, weak (R2), voids up to 1/16" over 10-15%, cavities (>5) 3/16"x3/16", fossil (casts/mold) concentrated at 171.6-172.0' Limestone 174.0-174.6' - yellowish gray, (5Y 7/2), moderate to strong HCl reaction, weak (R2), laminated, voids (<1/16") <1% of surface becoming more numerous, 5-10% is brown	R29: 9 minutes
-139.2 - -139.2 - - - - - - - - - 185	R30-HQ 5 ft 100%	54	2 0 1 >10	179.25-179.35' - Fractures, horizontal, smooth, planar, open 179.45' - Fractures, rough, stepped, open 180.8' - Fractures, rough, undulating, open 180.9' - Fractures, <5 deg, rough, stepped, open 182.95' - Fracture, <5 deg, rough, undulating, open 183.0-184.0' - Fracture zone, 0-<5 deg, smooth to rough, undulating stepped, open		laminae becoming thicker with depth.  No Recovery 174.6-175.0' Limestone  175.0-175.3' - dusky yellow, (5Y 6/4), mild HCl reaction, extremely weak (R0), friable  175.3-176.9' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, medium strong (R3), voids confined to cavity infilling  176.9-179.55' - yellowish brown to dusky yellow, (5Y 7/2 to 5Y 6/4), strong HCl reaction, weak to medium strong (R2 to R3), voids 1/16" over 5-10% of surface, cavities abundant	R30: 9 minutes
-144. <u>2</u>	R31-HQ 5 ft 100%	26	>10 >10 >10 10	185.0-186.0' - Fracture zone, gravels, vertical orientation  186.0' - Fracture zone, 0-90 deg, rough, stepped, open 186.1' - Fracture zone, vertical, rough, generally stepped to undulating 186.4' - Fracture zone, horizontal, rough, planar, open 187.5' - Fracture zone, 60 deg, rough, undulating, open 188.0-188.7' - Fracture zone, 60 deg and 70 deg, rough, undulating to stepped, open		in upper 0.5' (1-3/16"-1-9/16'x3/8-3/4") less frequent with depth  No Recovery 179.55-180.0' Limestone 180.0-181.7' - yellowish brown to dusky yellow, (5Y 7/2 to 5Y 6/4), strong HCI reaction, weak to medium strong (R2 to R3), voids 1/16" over 5-10% of surface, cavities (1-3/16" to 1-9/16"x3/8" to 3/4") abundant in upper 0.5' less frequent with depth 181.7-183.4' - yellowish gray mottled with pale greenish yellow, (5Y 7/2 with 10Y 8/2), strong HCI reaction,	R31: 8 minutes Stopped drilling for the day
190 -149.2 - - - - - - - - - - - - - - - -	R32-HQ 5 ft 100%	15	2 10 >10 >10 >10	190.1' - Fractures, rough to smooth, undulating, open 190.75' - Fractures, 10 deg, smooth, planar, open 190.85' - Fractures, <5 deg, rough, stepped, open 191.0-191.2' - Fracture zone, 60 deg, rough, stepped, open 191.4' - Fractures, 10 deg, smooth, planar, tight 191.7' - Fractures, 10 deg, smooth, undulating, open 192.0' - Fracture zone, 90-<5 deg, rough, stepped, open		weak to medium strong (R2 to R3), voids up to 1/16", ovate cavities up to 3/4"-1-3/16", fossil (cast), voids 183.4-185.0' - yellowish brown to dusky yellow, (5Y 7/2 to 5Y 6/4), strong HCI reaction, weak to medium strong (R2 to R3), interbeds of limestone similar to 181.7-183.4' 185.0-186.0' - light olive gray, (5Y 5/2), fine grained, mild HCI reaction, extremely weak (R0), voids, cavities (up to 3/8"-3/4"x3/8") over 50-60% of surface, fossils (mold/casts)	4/11/07 — Resume drilling 4/12/07 Water level 0.5' below ground surface



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 0.5	ft bg	s on 4/	10/07 START : 4/9/2007 END : 4	/17/200	D7 LOGGER: R. McComb, C. Doug	herty
≥∩≘	_ (%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H H H H	P.F.A.	(%) Q	150 100	DEPTH, TYPE, ORIENTATION, ROUGHNESS,		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS CORING RATE AND
PT.	NG.	OΩ	R F	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	CC LE RE	R(	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	ς	CHARACTERISTICS	BROFO, TEOT REGGETO, ETO.
-154.2			. 10	192.25-192.4' - Fracture zone, 60 deg, rough,		186.0-188.0' - yellowish gray, (5Y	
			>10	stepped, open, horizontal 192.6' - Fracture zone, 60 deg, rough,		<ul> <li>7/2), very fine grained, strong HCI reaction, medium strong (R3), voids</li> </ul>	1
_				stepped, open	1—	<1/16" over <1% of surface	1
-			>10	192.6-195.0' - Fracture zone, various orientation from subhorizontal to very vertical,		<ul> <li>188.0-190.0' - light olive gray, (5Y</li> <li>5/2), fine grained, mild HCl reaction,</li> </ul>	1
-	R33-HQ			stepped to undulating, rough to smooth, open	+	extremely weak (R0), voids, cavities	1
-	5 ft	0	>10	195.0-199.5' - Fracture zone, smooth,		<ul><li>(up to 3/8"-3/4"x 3/8") over 50-60% of</li></ul>	-
_	86%			undulating	-	surface, fossils (mold/casts) Limestone	-
_			>10		+	<ul> <li>190.0-190.85' - light olive brown, (5Y</li> </ul>	-
_			. 10			4/4), fine grained, mild HCl reaction, extremely weak to very weak (R0 to	
_			>10		$\perp$	- R1), laminated, voids and cavities up	R33: 12 minutes
	200.0		NR	_	$oldsymbol{ol}}}}}}}}}}}}}}}}}}$	to 2"x3/8" (coating) >5 at	
-159.2			<b>\</b>	200.0-201.0' - Fracture zone		190.3-190.4' becoming smaller with depth	Stopped drilling HQ on 4/12/07
			>10		$\Box$	190.85-191.4' - light olive brown, (5Y	Resume drilling on 4/17/07
_				201.0-202.0' - Fracture zone	$\perp$	4/4), fine grained, no to mild HCl	C. Dougherty begins
-			>10		1	reaction, extremely weak (R0), voids 1/16" or less over 3-5% of surface	logging _
_	R34-HQ			202.0-203.0' - Fracture zone	$\perp$	<sup>-</sup> 191.4-195.0' - grayish yellow, (5Y	-
-	5 ft	0	>10		+	<ul> <li>7/2), very fine to fine grained, very weak to extremely weak (R1 to R0),</li> </ul>	-
_	64%		0	203.0-203.2' - Fracture zone	-	laminated from 191.4-191.9,	-
_				203.0-203.2 - Fracture Zone	-	becoming massive-bedded with	-
_			NR		$\perp$	depth (gravelly) with fossil mold/casts 195.0-199.3' - yellowish gray, (5Y	l
_			INE		工	_ 7/2), very fine grained, moderate to	R34: 9 minutes
205_	205.0			_	Ы	strong HCl reaction, very weak (R1), — easily breaks along fracture plane,	
-164.2			5	205.1' - Fractures, rough, undulating,		voids over 1-3% to absent, cavities	
			5	horizontal, open 205.5' - Fractures, horizontal, rough,	$\mathbb{H}$	rare <5 (3/16"x3/16"), trace	1
				undulating, open	$\perp$	<ul> <li>laminations, trace calcareous stain</li> <li>No Recovery 199.3-200.0'</li> </ul>	1
			7	205.8' - Fractures, horizontal, smooth,	$\Box$	Limestone	1
_	R35-HQ			stepped 205.9' - Fractures, horizontal, smooth,	+	<ul> <li>200.0-201.0' - pale olive, (10Y 6/2), fine grained, moderate HCl reaction,</li> </ul>	1
-	5 ft	8	>10	stepped, black staining	$-\Box$	medium strong (R3), 1/4" thick zones	1
-	72%			206.0' - Fractures, horizontal, smooth, stepped, slight black staining	+	<ul><li>with voids up to 1/16"</li></ul>	-
-			>10	206.2' - Fractures, 45 deg, rough, undulating,	+	201.0-203.2' - light olive gray, (5Y 6/1), fine to medium grained,	-
-				black staining	$+\Box$	<ul> <li>moderate HCl reaction, weak (R2),</li> </ul>	R35: 8 minutes
_			NR	206.4-206.5' - Fractures, horizontal, smooth, undulating, <1/16" coating of silt size	-	20% voids up to 1/16", collapse breccia zone from 202.0-203.2'	1.00. 0 minutes
	210.0		Ш	particles on surface	+	— No Recovery 203.2-205.0'	_
-169.2			>10	206.8' - Fractures, horizontal, rough, undulating	世	Limestone	]
				207.0-208.6' - Fracture zone	$\mathbb{H}$	205.0-207.0' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction,	]
			_ ]	211.0' - Fractures, 20 deg, smooth,	Ш	weak (R2), voids to 1/16"x1/16" over	]
			5	undulating 211.2' - Fractures, horizontal, rough,	$\mathbb{H}$	25% of surface, few cavities 1"x1/4", poorly fossiliferous (molds/casts).	1
	R36-HQ			undulating, brown staining, on 50% of	$\Box$	voids over 3-5% of surface	1
-	5 ft 90%	40	3	surface 211.5-211.9' - Mechanical break, 35 deg,	111	<ul> <li>207.0-208.6' - light olive gray, (5Y</li> </ul>	
-	5070		$\vdash$	rough, undulating	111	<ul> <li>5/2), fine grained, mild HCl reaction, weak (R2), moderately fossiliferous</li> </ul>	
-			3	212.5' - Fractures, horizontal, rough,	$+\Box$	molds/casts, voids over 35% of	-
-				undulating, fine to medium grain particles on surface	+-	_ surface No Recovery 208.6-210.0'	R36: 8 minutes
-			2	213.2' - Fractures, horizontal, smooth,	+	- 140 NGCOVELY 200.0-2 10.0	-
215	215.0		NR	stepped	+		



PROJECT NUMBER: BORING NUMBER: 338884.FL

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 0.5	ft bgs	s on 4/	10/07 START : 4/9/2007 END : 4	/17/20	D7 LOGGER : R. McComb, C. Doug	herty
≳o.⊋	(%			DISCONTINUITIES	ဗ္က	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-174.2	SHR	R 0	H.H.	THICKNESS, SURFACE STAINING, AND TIGHTNESS	\ S	CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
-174.2 - -			>10	213.6' - Fractures, horizontal, smooth, planar, thin, (1/16" silt infill) 213.8' - Fractures, horizontal, rough, undulating, silt to fine grained particles 214.1' - Mechanical break, horizontal, rough,	片上	Limestone  - 210.0-211.2' - yellowish gray, (5Y 7/2), mild to moderate HCI reaction, weak (R2), some iron staining on fracture planes	- - -
_ _	R37-HQ 5 ft	17	1	undulating 215.0-216.0' - Fracture zone 216.9' - Fracture zone, iron staining on some	臣	211.2-213.2' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, weak (R2), highly fossiliferous	SC-10 collected at 217.0- 217.8'
_	70%		1	surfaces 217.8' - Fracture, 45 deg, rough, undulating,	士	(molds/casts) Limestone	-
_			NR	brown iron staining 218.2' - Fracture, horizontal, rough, undulating		<ul> <li>213.2-214.5' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, weak (R2), some iron staining on fracture planes</li> </ul>	R37: 9 minutes
	220.0			_		No Recovery 214.5-215.0'	
-179.2 - -			>10	220.0-221.8' - Fracture zone, fracture zone, brown iron, staining on some partings, fractures appear to be mainly along bedding	臣	Limestone  215.0-215.7' - light olive gray, (5Y 5/2), fine to medium grained, moderate HCl reaction, weak (R2),	_
-	D20 110		>10	planes	井	fossiliferous  215.7-216.9' - yellowish gray, (5Y	-
-	R38-HQ 5 ft 86%	35	1	223.3-223.0' - Mechanical break, rough, uneven	Ħ	7/2), fine grained, moderate HCl reaction, weak (R2), carbonate derived silt zone from 216.0-216.6' is	-
-			2	223.5' - Fractures, horizontal, smooth,	佳	_ laminated 216.9-217.8' - yellowish gray, (5Y	-
			>10	undulating, iron staining	上	7/2), weak (R2), uneven bedding plane, laminated, black staining	R38: 6 minutes
225 -184.2	225.0		NR	005 0 007 51 5 1	$\perp$	along bedding planes, <5% voids  217.8-218.5' - yellowish gray, (5Y	_
-104.2			>10	225.0-227.5' - Fracture zone, no fragments larger than 3" on the longest direction, about 50% of volume is fragments 1" or less	井	7/2), weak (R2), 10% voids, fractured, poorly fossiliferous No Recovery 218.5-220.0'	
-	R39-HQ		>10		Ħ	Limestone 220.0-221.3' - yellowish gray, (5Y 7/2), moderate HCl reaction, weak	-
- -	5 ft 50%	0	>10		芦	(R2), laminated bedding some are uneven, voids over 20% of surface, iron staining on bedding plane, poorly	-
-			NR			fossiliferous, fractures are along bedding plane  - 221.3-223.5' - light olive gray, (5Y 5/2), fine grained, mild to moderate	R39: 13 minutes
230 -189.2 -	230.0		>10	230.0-232.0' - Fracture zone, rock fragments, with some 1-3" long sections of core	臣	HCl reaction, weak (R2), voids 1/16" — over 20% of surface, cavities 3/8"x3/4" over 5% highly fossiliferous	_
-			>10	33.10 . 3 . 5.15.15 334.16.16 37 36.16	井	(molds/casts)  223.5-224.3' - light olive gray, (5Y 5/2), fine grand, moderate HCI	_
-	R40-HQ 5 ft	0	>10	232.0-233.4' - Fracture zone, carbonate derived fine to medium grain particles with	臣	reaction, weak (R2), laminated, no voids, non fossiliferous No Recovery 224.3-225.0' Limestone	
-	68%		>10	some rock fragments	+	225.0-225.7' - light olive gray, (5Y 5/2), fine grained, moderate HCl	Sample pulverized below
-			NR		拝	reaction, weak (R2), fragments have voids 15% below 225.4'	232.9' R40: Run time not
_ 235	235.0		INFX		臣	-	recorded -
233	200.0				1		



WATER LEVELS: 0.5 ft bgs on 4/10/07

PROJECT NUMBER: BORING NUMBER: 338884.FL A-23 SHEET 13 OF 13

# **ROCK CORE LOG**

LOGGER: R. McComb, C. Dougherty

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723141.4 N, 458146.5 E (NAD83)

DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams ELEVATION: 40.8 ft (NAVD88)

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing START: 4/9/2007

	LLVLLS . U.	, it bg	3 011 4		T		
ŞΩ£	(%			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-194.2				235.0-236.1' - Fracture zone, rock fragments,	ш	225.7-227.5' - yellowish gray, (5Y	
- - - - -	R41-HQ 5 ft 22%	0	>10 (>10) NR	irregular shape, generally 2" length or less		- 7/2), fine grained, moderate HCI reaction, weak (R2), voids, casts/molds, iron staining on partings, voids <5% of surface, poorly fossiliferous  No Recovery 227.5-230.0'  Limestone 230.0-231.9' - light olive gray, (5Y 5/2), fine grained, moderate HCI reaction, weak (R2), zone of voids over 40% of surface from 230.7-231.1'	- - - - - - - - - - -
	040.0				╁	<ul> <li>Limestone</li> <li>231.9-233.4' - dusky yellow, (5Y 6/4),</li> </ul>	-
240 <u> </u>	240.0		>10	240.0-243.0' - Fracture zone, mostly rock fragments 240.0-243.0', with 2 pieces of core about 3" long	Ħ	fine grained, moderate HCl reaction, very weak (R1) No Recovery 233.4-235.0'	-
-			>10			Limestone 235.0-236.1' - yellowish gray, (5Y 7/2), fine grained, mild to moderate	-
-	R42-HQ 5 ft 68%	0	>10	242.7-245.9' - Fracture zone, top and bottom		HCl reaction, weak (R2), fragments have 10% voids, poorly fossiliferous No Recovery 236.1-240.0'	-
			2	are 10 to 20 degrees from horizontal,	П	Limestone 240.0-241.3' - Same as 235.0-236.1'	-
-			NR	respectively 243.0-243.1' - Fractures, horizontal, smooth, undulating, carbonate derived fine grain particle on faces of fracture, bedding plane		241.3-242.0' - yellowish gray, (5Y 7/2), fine grained, very weak (R1), poorly fossiliferous	R42: 6 minutes
245 -204.2	245.0			_	仜	242.0-242.5' - light olive gray, (5Y — 5/2), fine grained, medium strong	
-204.2			>10	245.0-248.0' - Fracture zone, rock fragments	Ħ	(R3), poorly fossiliferous, iron staining along bedding planes, bedding planes are uneven and	-
-	5.0.10		>10			undulating 242.5-243.4' - yellowish gray, (5Y - 7/2), fine grained, mild to moderate	-
-	R43-HQ 5 ft 60%	0	>0		Ħ	HCl reaction, weak (R2), voids over 50% of surface, moderately fossiliferous (casts/molds)	-
- - 250_	250.0		NR			No Recovery 243.4-245.0' Limestone - 245.0-248.0' - yellowish grey, (5Y 7/2), fine to medium grained, mild to moderate HCl reaction, very weak (R1), fractures, massive, poorly	R43: 4 minutes
-209.2 - - -						fossiliferous (casts)  No Recovery 248.0-250.0'  Bottom of Boring at 250.0 ft bgs on 4/17/2007	- - -
-						- - -	-
-						-	-

END: 4/17/2007

ORIENTATION : Vertical



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-24	SHEET	1	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723114.5 N, 458174.3 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 4.0 ft bo	gs on 04/2	20/07	START : 4/18/2007 END : 4/20/2007	LOGGER	: C.	Dougherty
300				STANDARD	SOIL DESCRIPTION		G	COMMENTS
AND (ff)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR	,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY O	)R	BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALO	GY	SYM	INSTRUMENTATION
40.6	0.0				Poorly Graded Sand With Silt (SP-SM)	ii.a.a	H	
		1.1	SS-1	2-2-3 (5)	0.0-1.1' - medium light gray, (N6), moist, loose, fi grained, no HCl reaction, 5% nonplastic fines,			
l .	1.5			(-)	organics roots decreasing with depth, sand is silic	ica		_
_						_		_
-	-					_		-
-	1					_		-
-	1					-		-
-	1					-		-
5	5.0					-		-
35.6	3.0				Silty Sand (SM)		П	
-	1	1.1	SS-2	2-2-2 (4)	5.0-6.1' - yellowish gray, (5Y 7/2), wet, very loose grained, no HCl reaction, 25% low to nonplastic f	e, fine   – fines.		-
-	6.5			(4)	trace iron nodules, trace roots, sand is silica		111	-
						]		
_								_
_						_		_
-						_		-
-	-					-		-
-						-		-
10 30.6	10.0				Silty Sand And Limestone (SM)		1.14	
-	1	1.0	SS-3	3-5-4	10.0-10.95' - light gray, (N7), wet, loose, very fine fine grained, moderate to strong HCl reaction, mi	e to -		-
-	11.5			(9)	with yellowish gray (5Y 8/1) fine to medium sand	sized /	111	<del>-</del>
-	11.0				carbonate grains, 24% fines, 30% fine to coarse gravel-sized carbonate grains, limestone fragmen	ents at / -		-
					bottom of sample, sand is silica			
								_
_						_		_
-	-					-		-
-	-					-		-
15 <u> </u>	15.0				Silt (ML)		Ш	
-	-	1.5	SS-4	40-49-17	15.0-16.5' - very pale orange, (10YR 8/2), wet, ha	ard, -		-
-	16.5	1.0	00 +	(66)	rapid dilatancy, moderate HCl reaction, 5% grave trace fine grained sand, fine grained lamination,	ei,		-
-	10.5				nonplastic, all carbonate			-
						-		-
						1		_
						]		
-	1							_
-	-					-		-
20								



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-24	SHEET	2	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723114.5 N, 458174.3 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

					CTART 4/49/2007 FNR 4/20/2007 LOCCER & Development
WATER	LEVELS	: 4.0 ft bo	us on 04/2		START: 4/18/2007 END: 4/20/2007 LOGGER: C. Dougherty  SOIL DESCRIPTION COMMENTS
≷Q₽	CVMDIL	INTERVA	I (ft)	STANDARD PENETRATION	O COMMUNICIALS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAIVIPLE			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
ATI		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
SURI ELE			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
20.6	20.0			( )	Limestone Fragments And Silt (ML)  Casing set at 20' below ground surface
-		1.5	SS-5	39-20-13	20.0-20.5' - dusky yellow, (5Y 6/4), fine to coarse grained, moderate to strong HCl reaction, angular,
-	21.5			(33)	\limestone fragments \ \frac{1}{ } \limestone fragments
-	21.5				Silt (ML)
-					\\20.5-21.5' - Same as 15.0-16.5' except moderate to \\strong HCl reaction, 1/2" fragments of coarse sand to \
-					fine limestone gravel at 20.6 and 21.0, all carbonate
-					
-					
-					
25	25.0				
15.6	25.0				Sandy Silt (ML)
-		1.1	SS-6	10-10-4	25.0-26.1' - yellowish gray, (5Y 7/2), wet, stiff, rapid dilatancy, moderate HCl reaction, 31% fine to medium
-	00 E			(14)	grained sand, nonplastic
-	26.5				
-					
-					
-					
-					
-					
	20.0				
30 <u> </u>	30.0				Silt With Sand (ML)  Drilling ends 4/18/07
-		1.1	SS-7	5-6-25	30.0-31.1' - Same as 25.0-26.1' except 20-25% fine to coarse grained sand
-	31.5			(31)	Coalse grained saild
-	01.0				1 11
-					1 1
-					1 1
-					1 1
-					1 1
1 -					1 1
35	35.0				1 1
5.6		0.6	SS-8	22-72/7	Silty Gravelly Sand (SM)
-	35.6	<b>+</b>		(72/7")	35.0-35.6' - pale yellowish brown, (10YR 6/2), wet, very dense, mild to moderate HCl reaction, 30% fine
-					\to coarse grained gravel, 30% low plastic fines, all
-					\carbonate \ \ \ -
1 -					Driller's Remark: Organic material in cuttings
1 -					at about 37' below ground surface
1 -					1 1
1 -					1 1
1 -					1 1
40					1 1



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-24	SHEET	3	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723114.5 N, 458174.3 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 4.0 ft b	gs on 04/2	20/07	START : 4/18/2007 END : 4/20/2007 LOGGER : C. Dougherty
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
JEE JEE		RECOVE	ERY (ft)	120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DEPTH OF CASING, DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
SC				(N)	
0.6	40.0			20-35-34	Sandy Silt (ML) 40.0-41.5' - pale yellowish brown, (10YR 6/2), wet,
_		1.5	SS-9	(69)	hard, rapid dilatancy, moderate HCl reaction, 25-30%
_	41.5				fine to medium grained sand, low plastic, trace organics, all carbonate
_					
_					
_					
_					
_					
_					
45	45.0				
-4. <del>4</del>				3-9-27	Silty Sand (SM) 45.0-46.5' - pale yellowish brown, (10YR 6/2), wet,
_		1.5	SS-10	(36)	dense, moderate HCl reaction, 40% low plastic fines,
_	46.5				fine to coarse grained sand, trace fine gravel, all carbonate
_					
_					
_					
_					
_					_
_					_
50	50.0				On the Oile (MI)
-9.4 -				47-32-49	Sandy Silt (ML) 50.0-51.4' - light olive gray, (5Y 5/2), trace black iron
_		1.4	SS-11	(81)	mottling, moist, hard, rapid dilatancy, moderate HCl reaction, 30% fine to medium grained sand, 50%
_	51.5				coarse grained sand in last 3.6" of sample, all
_					\carbonate
_					-
_					-
-					
-					
-					
55 <u> </u>	55.0	0.4	00 10	50/5	Sandy Silt (ML)
	55.4	0.4	SS-12	(50/5")	↑ 55.0-55.4' - pale to moderate yellowish brown, (10YR /=
-					6/2 to 5/4), wet, hard, moderate HCl reaction, 35% / fine to medium grained sand, nonplastic, trace
-					organics in lenses <1/16", all carbonate
-					
-					
-					
-					
-					
60_					



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	A-24	SHEET	4	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723114.5 N, 458174.3 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 4.0 ft bo	gs on 04/2	20/07	START : 4/18/2007
300				STANDARD	SOIL DESCRIPTION g COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR  DRILLING FLUID LOSS, TESTS, AND
DEP- SURI ELE/			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
-19.4	60.0 60.7	0.4	SS-13	34-50/2 (50/2")	Silt (ML)  ☐ 60.0-60.4' - moderate yellowish brown, (10YR 5/4),
-	60.7			(50/2)	1 \ wet. hard, rapid dilatancy, moderate HCl reaction.
-					10-15% fine to medium grained sand, 1/16" layers of organic material at top 3.6" of samples, trace iron
-					nodules, has a bedded appearance, irregularly laminated, all carbonate Driller's Remark: Organics in cuttings at
-					about 62' below ground surface
-					
-					
-					1 1
65_	65.0				
-24. <del>4</del>				13-15-13	Silty Sand (SM) 65.0-65.7' - yellowish gray, (5Y 7/2), wet, medium
-		1.1	SS-14	(28)	dense, fine to medium grained, moderate HCI reaction, 40% low plastic fines, trace coarse grained
-	66.5				\sand at 65.4', all carbonate
-					Silt With Sand (ML)
-					dilatancy, moderate HCI reaction, 26% fine to medium grained sand, low plastic fines, all carbonate
-					grained sand, low plastic lines, all carbonate
-					1
					]
70	70.0	0.1	SS-15	50/2	Limestone Fragments
-29. <del>4</del> -	70.2			(50/2")	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-					Begin Rock Coring at 70.0 ft bgs
-					See the next sheet for the rock core log
-					1 1
					]
l _					
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75 <u> </u>					
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80					<del>                                     </del>



PROJECT NUMBER:

338884.FL

BORING NUMBER:

A-24 SHEET 5 OF 9

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723114.5 N, 458174.3 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DISCONTINUES   COMMENTS   COMME	WATER	LEVELS: 4.0	ft bgs	s on 04	4/20/07 START : 4/18/2007 END : 4/	20/200	7 LOGGER : C. Dougherty	
Table   Compared   C	<0 €	(%)			DISCONTINUITIES	၂ ပွ	LITHOLOGY	COMMENTS
Table   Compared   C	ANI (F	N, AND 3Y (9	_	ES T	DESCRIPTION			SIZE AND DEPTH OF CASING
Table   Compared   C	H BE ATIC	E RU STH, OVEF	(%)	T.00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30 S		FLUID LOSS, CORING RATE AND
Table   Compared   C	LEV LEV	ORE	Ø	RAC ER I		×₩	AND ROCK MASS CHARACTERISTICS	
R1-HG    Sft   S			IĽ.	ша		o l		Driller's Pemark: Tools
R1-HG   St   HG   St   St   St   St   St   St   St   S	-25.4	70.0		0		Ħ	- 70.0-73.0' - light olive gray, (5Y 5/2),	were bouncing when -
R1-HO   Str   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure zone   R2-HO   Practure	-					世		hammering, also chatter
R1-Ho   5   35   1   1   1   1   1   2   1   2   2   2	_			3	71.2-71.6' - Fracture zone, rock fragments	₽₽		ground surface. Driller -
St	_	54.110			71 9' - Fracture 20 deg rough undulating	ш	•	
75. 75.0  NR  75. 75.0  NR  75. 75.0  R2+10 Sft	_		35	1	open, coating of carbonate derived silt	ш	-	
NR   NR   75   75.0	-				72.6' - Fracture zone	╁┼┼		
NR   NR   75   75.0	_					Ħ	No Recovery 73.0-75.0	
Limestone   T5.0-75.0   T5.9-76.6' - Fracture zone   T5.0-76.6' - Same as 70.0-73.0'   except cavities (2) up to 1/2' wide and 1/2' deep   No Recovery 76.6-80.0'   R2-HO   Soc.   Soc	_			NR		Н	_	70.2'
34.4	_					Н	_	R1: 6 minutes
80 80.0  -39.4  R2-HO 5 ft 32%  NR  NR  80 80.0  -39.4  R3-HO 5 ft 100%  R3-HO 6 ft 100%  R3-HO 6 ft 100%  R3-HO 6 ft 100%  R3-HO 6 ft 100%  R3-HO 7 ft 100%  R		75.0			_	尸	<del>_</del>	
75.9-76.6' - Fracture zone  75.9-76.6' - Fracture zone  75.9-76.6' - Fracture zone  75.9-76.6' - Fracture zone  75.9-76.6' - Fracture zone  75.9-76.6' - Fracture zone  80 80.0  80 98.0  80 98.	-34.4			0		口		
R2-HQ 5 ft 32% NR R8.8, 80.9, 81.4, 81.5, 81.6, 82.0, 82.3' - Mechanical break (8)					75.0.76.61. Fronting rose	Н	except cavities (2) up to 1/2" wide	75.9'
R2-HO	_			2	19.8-10.0 - Flacture Zone	H	and 1/2" deep	_
Solution   Solution						耳	No Recovery 76.6-80.0'	_
80 80.0			10			Ш		
B0 80.0  -39.4  0  80.7, 80.8, 80.9, 81.4, 81.5, 81.6, 82.0, 82.3' -  Mechanical break (8)  80.0-85.0' - light olive gray, (5Y 5/2), very fine grained, moderate HCl reaction, very weak (R1), voids 11/6" or less over 20.30% of surface, cavities 3/8" in diameter over 5%, moderately fossiliferous, 1/8" organic layers at 83.2' and 84.1'  83.0-83.3' - Fracture zone  84.0-84.3' - Fracture zone  85.0-91.0' - Same as 80.0-85.0' except weak to medium strong (R2 to R3)  87.6-88.2' - Fracture zone  87.6-88.2' - Fracture zone  R4: 9 minutes			10			Ш		
80 80.0				NR		Ш	-	
80 80.0						Ш	-	<u> </u>
-39.4						Н	-	R2: 6 minutes
80.0-85.0' - light olive gray, (5Y 5/2), very fine grained, moderate HCI reaction, very weak (R1), voids 1/16" or less over 20-30% of surface, cavities 3/8" in diameter over 5%, moderately fossiliferous, 1/8" organic layers at 83.2' and 84.1'  83.0-83.3' - Fracture zone  84.0-84.3' - Fracture zone  84.0-84.3' - Fracture zone  85.0-91.0' - Same as 80.0-85.0' except weak to medium strong (R2 to R3)  87.6-88.2' - Fracture zone  87.6-88.2' - Fracture zone  87.6-88.2' - Fracture zone	80	80.0				Н	-	l -
80.7, 80.8, 80.9, 81.4, 81.5, 81.6, 82.0, 82.3' - Mechanical break (8)  R3-HQ 5 ft 100% 65 0 >10 83.0-83.3' - Fracture zone  84.0-84.3' - Fracture zone  85.0-91.0' - Same as 80.0-85.0' except weak to medium strong (R2 to R3)  R3-HQ 5 ft 100%  83 > 10 0 87.6-88.2' - Fracture zone  87.6-88.2' - Fracture zone  R4: 9 minutes	-39.4	·			_	H		_
R3-HQ				U	80.7. 80.8. 80.9. 81.4. 81.5. 81.6. 82.0. 82.3' -	Ш		l -
R3-HQ					Mechanical break (8)	Н	reaction, very weak (R1), voids 1/16"	<u> </u>
S ft   100%   65   0     83.0-83.3' - Fracture zone				U		Ш		<u> </u>
100%			0.5			Ш		<u> </u>
S5   85.0   >10   84.0-84.3' - Fracture zone			65	U		Ш	ayers at 83.2 and 84.1	_
85 85.0					83.0-83.3' - Fracture zone	H	-	_
85 85.0				>10			-	
85 85.0	-			, -	84.0-84.3' - Fracture zone	世	-	R3: 5 minutes
Limestone 85.0-91.0' - Same as 80.0-85.0' except weak to medium strong (R2 to R3)  R4-HQ 5 ft 100% 83 >10 87.6-88.2' - Fracture zone 0 R4: 9 minutes	85	85.0		>10		╁┼	-	
R4-HQ 5 ft 100% 83 >10 87.6-88.2' - Fracture zone 0 R4: 9 minutes	-44.4				_	口		
R4-HQ 5 ft 100% 83 >10 87.6-88.2' - Fracture zone R4: 9 minutes	-			0	,	団		
R4-HQ 5 ft 100% 83 >10 87.6-88.2' - Fracture zone 0 R4: 9 minutes	1 -					╁┼		-
5 ft 100% 83 >10 87.6-88.2' - Fracture zone 0 R4: 9 minutes	-			0		日	-	-
100% 87.6-88.2' - Fracture zone 0 R4: 9 minutes	-					Ħ	-	-
0 0 R4: 9 minutes	-	5 ft	83	>10	87 6-88 2' - Fracture zone	ㅂ	-	
R4: 9 minutes	-	- 100% 				╁┼	-	
<b>1</b> −	-			0		口	-	-
	-					丗	-	R4: 9 minutes
		00.0		0		╆	-	-
	90	90.0				$\Box$		



PROJECT NUMBER:	BORING NUMBER:				
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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723114.5 N, 458174.3 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 4.0	ft bg	s on 04	1/20/07 START : 4/18/2007 END : 4/	20/200	7 LOGGER : C. Dougherty			
30₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
-49.4	011		0		H	-	SC-2 collected at 90.0- 90.9'		
-			>10	90.9-91.8' - Fracture zone, rock fragments, some fragmens have partial (10%) coating of grayish brown (5YR 3/2) clay		Limestone 91.0-93.0' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction.	-		
_	R5-HQ 5 ft 60%	35	1	92.1' - Joint, smooth, undulating, possible cavity, open		medium strong to strong (R3 to R4), voids <1/16" over 20% of surface, solution cavity 1/2"x1.5"x3/4" deep at	Driller's Remark: Lost circulation at 92'		
_			NR			92.5', 1/16" wide weathered area around edges of cavity No Recovery 93.0-95.0'	-		
95 -54.4	95.0			_	Ħ	- 	R5: 9 minutes		
-54.4	4.4 - -		>10			Limestone - 95.0-99.2' - Same as 80.0-85.0' except trace organics at 97.6'	-		
-	R6-HQ		1	96.8' - Joint, 60 deg, smooth, undulating, coating of carbonate derived silt, tight	目	- -	- -		
-	5 ft 100%	57	1	97.2-98.0' - Fracture, vertical, rough, undulating		-	-		
_	-		>10			- - _ 99.2-99.6' - medium light gray, (N6),	R6: 10 minutes		
100 -59.4	100.0		>10			very fine grained, moderate HCl reaction, medium strong to strong (R3 to R4)			
-			>10	101.5-101.9' - Fracture zone		99.6-104.0' - Same as 95.0-99.2' -	-		
-	R7-HQ 5 ft 80%	48	48	48	1	102.3' - Joint, 35 deg, rough, undulating, black iron staining, open		- -	-
-			1	103.8' - Joint, horizontal, rough, undulating,		- - -			
	105.0		NR	open		No Recovery 104.0-105.0'	R7: 8 minutes		
-64.4 - -			2	105.6, 105.9' - Fractures (2), horizontal, rough, undulating, open		Limestone  - 105.0-108.7' - light olive gray, (5Y 5/2), very fine grained, weak to medium strong (R2 to R3), <1/16"	-		
-	- R8-HQ - 5 ft - 74%		0	107.0' - Fracture or mechanical break,		<ul> <li>voids over 40% of surface, moderately fossiliferous (cast and molds), color change to yellowish</li> </ul>			
-		40	>10	horizontal 107.0-107.4, 107.7-107.9' - Fracture zone (2), horizontal, coating of carbonate derived		gray, (5Y 7/2), at 108.3' and very weak (R1)	- -		
-			NR	silt 108.4' - Fracture or mechanical break, horizontal, loose		No Recovery 108.7-110.0'	R8: 5 minutes		
110	110.0								
					1		l .		



PROJECT NUMBER:

33884.FL

BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723114.5 N, 458174.3 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 4.0	) ft bgs	s on 0	4/20/07 START : 4/18/2007 END : 4/	20/20	D7 LOGGER : C. Dougherty		
>00	(9			DISCONTINUITIES	g	LITHOLOGY	COMMENTS	
ELOV SN (ft	IN, AND 3Y (%	_	ZES T	DESCRIPTION	CLO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD	
	CO LEN RE	RQ	FR/ PEF	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.	
-69.4			0		$\mathbb{H}$	<b>Limestone</b> - 110.0-114.0' - Same as 105.0-108.7'		
l _					$\perp$	except poorly fossiliferous		
_			0		$\perp$	-	SC-3 collected at 111.4-	
_	D0 110				Т	_	112.4'	
-	R9-HQ 5 ft	78	0		上	_	_	
-	100%			112.6-112.9' - Mechanical break		_	-	
_			2	113.3' - Joint, 20 deg, smooth, undulating,	+	-	_	
-			$\vdash$	dark staining, loose 113.7' - Joint, 60 deg, smooth, undulating,	+	114.0-115.0' - dusky yellow, (5Y	R9: 8 minutes	
115	115.0		1	dark staining, loose 114.0, 114.9' - Mechanical break (2)	F	<ul> <li>6/4), fine to very fine grained, strong HCl reaction, very weak (R1), 1/16"</li> </ul>		
115 <u></u> -74.4	115.0			114.3' - Fracture zone or mechanical break	片	voids over 15% of surface, poorly	-	
-			1	115.0-115.4' - Joint, 80 deg, rough, undulating, black iron staining on 25% of the	Ħ	<ul> <li>fossiliferous</li> <li>115.0-117.0' - Same as 110.0-114.0'</li> </ul>		
-					surface 115.5' - Mechanical break	片	except <1/16" voids over 20% of	1
_			0	116.3-116.5' - Mechanical break	Ľ	- surface	1	
	R10-HQ 5 ft	40	>10	117.0-118.1' - Fracture zone	L	117.0-118.2' - moderate olive brown,		
	90%	40	/10			<ul> <li>(5Y 4/4), moderate HCl reaction, very weak (R1), zone of carbonate</li> </ul>		
			0			derived silt at 117.0-117.4' and - 117.8-118.0'		
_					$oxed{\bot}$	118.2-119.5' - light olive gray, (5Y		
_			>10	119.0-119.5' - Fracture zone	Ш	5/2), moderate HCl reaction, weak (R2), voids (1/16") over 20% of	R10: 8 minutes	
120 -79.4	120.0		NR	_	口	surface, larger voids (up to 3/8") over 5% of surface, moderately	_	
-			3	120.4-120.7' - Fracture zone	$\perp$	<ul><li>fossiliferous (molds)</li></ul>	Fragments from 120.4-	
-						No Recovery 119.5-120.0' Limestone	120.4' appear to have been _ cored at two different	
_			3	121.3' - Fracture, 20 deg, smooth, planar, coating of carbonate derived fine sand		<ul> <li>120.0-120.5' - Same as 118.2-119.5'</li> <li>120.5-123.6' - light olive gray, (5Y</li> </ul>	angles indicating they were	
-	R11-HQ			particles on face, along bedding plane	$\vdash$	5/2), moderate HCl reaction, weak to	loose in borehole	
_	5 ft 72%	20	1	121.5-121.8' - Fracture zone 121.7' - Fracture, 20 deg, smooth, planar,	╁	<ul> <li>medium strong (R2 to R3), voids</li> <li>&lt;1/16" over 30% of surface, few</li> </ul>	1	
_			0	along bedding plane	F	large voids (3/8"x1"), moderately fossiliferous, voids oriented parallel	1	
						to bedding plane at about 20	1	
			NR		片	degrees, large cavity (3/8"x1-3/16") present at 122.0', laminated bedding	R11: 6 minutes	
125_	125.0			_	片	(1/16"-1/4") below 122.5'  No Recovery 123.6-125.0'	]	
-84. <del>4</del>			1		片	_ Limestone	]	
-				125.8' - Fracture, horizontal, rough,	片	125.0-127.8' - Same as 118.2-119.5' - except zone of larger (3/4"x3/8")	-	
-			1	undulating, coating of carbonate derived silt on faces. loose	世	_ cavities from 125.8-126.3' over 30% of surface, voids (<1/16") over 25%	-	
-	R12-HQ			126.3' - Joint or mechanical break, horizontal,	L	of surface of surface	-	
-	- 5 ft	38	0	rough, undulating	+	-	-	
-	56%				H	- No Recovery 127.8-130.0'		
-			NID		厈	-		
-			NR		口	-	R12: 5 minutes	
130	130.0				口	-	1	
					ĺ			
					1			



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723114.5 N, 458174.3 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 4.0	ft bgs	s on 04	4/20/07 START : 4/18/2007 END : 4/	20/20	07 LOGGER : C. Dougherty	
< □ €	(%			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-89.4 - - -			NA >10	130.0-130.7' - Fracture zone, mostly carbonate derived fine sand and silt size fragments 130.7-132.0' - Fracture zone, only rock fragments, 2"x3", breakage is mostly along		Carbonate Derived Silty Sand (SM)  130.0-130.7' - light olive gray, (5Y 6/1), wet, fine to medium grained, moderate to strong HCl reaction, staining, 25% silt	End drilling 4/19/07, 17:20 hrs - Resume drilling 4/20/07, 07:45 hrs Driller's Remark: Water -
- - - - - 135	R13-HQ 5 ft 40% 135.0	0	NR	bedding planes		Limestone 130.7-132.0' - light olive gray and dusky yellow, (5Y 5/2 and 5Y 6/4), fine grained, mild to moderate HCI reaction, medium strong to strong (R3 to R4), gray and yellow areas interbedded in 1-inch beds, grey areas are medium to strong (R3 to R4) with few (1/16" or less) voids, dusky yellow areas are weak (R2)	level 4' below ground surface R13: 7 minutes -
-94.4 - -	100.0		>10	_		with 30% voids, light olive gray limestone increases with depth, bedding oriented from 0-10 degrees No Recovery 132.0-135.0'	- - -
- -	R14-HQ 5 ft	57	1	136.6' - Joint, horizontal, rough, undulating, iron staining, open		Limestone     135.0-137.7' - moderate olive brown,     (5Y 4/4), fine grained, mild HCI     reaction, medium strong (R3),	- - -
-	88%		0	137.5' - Fracture zone or mechanical break, horizontal		moderately fossiliferous, (1/16") voids over 20% of surface, cavities (>3/16") and fossil molds over 10% of surface, <3/16" fragments of gray	-
140 -99.4	140.0		0 NR	_		limestone included in matrix at about 2-3% from 136.3-137.5', 1" fragments 137.5'-137.7'. 137.7-139.4' - medium gray mottled	R14: 11 minutes
- - - -	R15-HQ 5 ft 92%	70	1 0	141.5' - Joint, horizontal, rough, undulating, iron staining, coating of carbonate derived fine sands on 15% of surface		yellowish gray, (N5, mottled 5Y 7/2), fine to very fine grained, mild HCI reaction, medium strong (R3), coloration surroundings and within cavities, highly fossiliferous (cavities and molds), few (<1/16") voids, cavities (up to 1.5"x2.5") over 15% No Recovery 139.4-140.0' Limestone	- - - - - -
- - 145 -104.4	145.0		0 0 NR	_		140.0-142.0' - Same as 137.7-139.4' except yellowish gray (5Y 7/2) at - 140.7-142.0' 142.0-143.0' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4),	SC-4 collected at 143.5- 144.6' - R15: 9 minutes
-			0			thinly laminated (crenelated in top 2.4" of section), few (<1/16") voids above 142.5', 15% voids from 142.5-148.0', few voids to 3/16" 143.0-144.6' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2),	- - -
-	R16-HQ 5 ft 76%	68	0			moderate HCI reaction, weak (R2), laminated bedding, areas of voids (1/16") correspond to bedding  No Recovery 144.6-145.0'	- - -
- 150	150.0		NR			-	R16: 5 minutes



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723114.5 N, 458174.3 E (NAD83)

ELEVATION: 40.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

COMING	WETTODA	ND L	VIIIV	IENT: CIME 550X S/N 340253, mud rotary, HQ tools, HV	v cas	niig	ORIENTATION: Vertical
WATER	LEVELS: 4.0	ft bg	s on 0	4/20/07 START : 4/18/2007 END : 4/	20/20	007 LOGGER : C. Dougherty	
>				DISCONTINUITIES	O	LITHOLOGY	COMMENTS
A PICON	- ZN ≻ - ZN ≻		SII.	DESCRIPTION	Ĭ	ROCK TYPE, COLOR,	OIZE AND DEDT!! OF CAC!!!
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F A A	NGT CO/	R Q D (%)	ACT R F(	PLANARITY, INFILLING MATERIAL AND	MBC	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
吕S급	응필盟	A O	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	ς	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-109.4					ш	Limestone	
-			0		Т	- 145.0-145.4' - olive gray to yellowish gray, (5Y 3/2 to 5Y 7/2), fine grained,	-
-					Н	mild to moderate HCl reaction,	-
-			0		Ħ	- medium strong to strong (R3 to R4),	<del>-</del>
-	R17-HQ				╫	very fossiliferous, voids (<1/16") over 30% of surface, larger (up to	SC-5 collected at 151.9-
-	5 ft	92	0		-	- 3/8"x3/8") cavities and fossil molds	152.9' _
_	100%				Н	over 5% 145.4-145.7' - yellowish gray, (5Y	_
-			>10	153.3-153.8' - Fracture zone, fragments 1/16"	$\vdash$	<ul> <li>7/2), fine grained, mild HCl reaction,</li> </ul>	_
_				to 1-9/16"	Ľ	strong (R4), few voids (<1/16")	
_			0		⊬	(5Y 4/4), fine grained, mild HCI	R17: 9 minutes
155	155.0				Щ	reaction, medium strong (R3), voids	
-114.4			4	_	П	(<1/16") up to 50% of surface (few from 146.0-146.4' and 146.8-147.5'),	
1 -			1	155.7' - Fracture, rough, undulating, iron	$\vdash$	cavities (up to 1" in diameter) over	-
-				staining on <5%, open	Ħ	5% from 147.0-148.8' No Recovery 148.8'-150.0'	-
-			1		╁	Limestone	-
-	R18-HC				ш	150.0-155.0' - yellowish gray, (5Y	-
-	5 ft	75	1	157.6-158.2' - Fracture zone		7/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4),	-
-	90%			137:0-130:2 - 1 facture 20ffe	╁	thinly laminated from 152.0-153.8',	-
_			>10		t	voids (<1/16") over 10% of surface from 150.0-152.5', 30% voids from	-
-					₽	152 5 154 0' trace voide (up to 3	D10: E minutos
_			0		П	/16") and fossil molds	R18: 5 minutes
160	160.0		NR		$\perp$	155.0-156.9' - Same as 145.7-148.8' 156.9-157.3' - yellowish gray, (5Y	
-119.4					1	7/2) fine to very fine grained	Total Depth at 160' at 09:45 hrs, 4/20/07
_						moderate HCl reaction, medium	-
						strong (R3), thin (1/4") bedding, few voids, abrupt change from light olive	
					1	gray with voids to yellowish gray with	<del>-</del>
_					1	- few voids, changes back at 157.3' (bedding, <5 degree from horizontal),	-
-					1	tight	-
-					1	- 157.3-159.5' - Same as 145.7-148.8'	<del>-</del>
-					1	except weak (R2), thinly bedded (1/2"-1") friable zone from	-
-					┨	- 157.6-158.2'	_
-					┨	No Recovery 159.5-160.0'  Bottom of Boring at 160.0 ft bgs on	_
-				_	-	— 4/20/2007	_
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PROJECT NUMBER:	BORING NUMBER:		
338884.FI	Δ-24Δ	SHEET	1 OF 5

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723110.0 N, 458176.7 E (NAD83)

ELEVATION: 40.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 4.0 ft bo	s on 04/2	20/07		ID: 6/15/2007	LOGGER	: J. ¯	Townes
1.				STANDARD	SOIL DI	ESCRIPTION		G	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS				SYMBOLIC LOG	
BRA		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		OR,	) CIC	DEPTH OF CASING, DRILLING RATE,
PTH EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL S	STRUCTURE, MINERAL	OR OGY	MBC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
SUI			<i>"</i> · · · · _	(N)				SΥ	
40.3									
_							1		_
-	1						1		Blind drill to 25'
-	1						- 1		Install SW casing to 10'
-	1						-		-
-	-								-
-	-						4		Water level obtained from boring A-24
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5							_		
35.3	]								_
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PROJECT NUMBER:	BORING NUMBER:		
338884 FI	Δ-24Δ	CHEET	2 OF 5

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723110.0 N, 458176.7 E (NAD83)

ELEVATION: 40.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WAT	WATER LEVELS: 4.0 ft bgs on 04/20/07											
					STANDARD	SOIL DESCRIPTION	]	COMMENTS				
AND	E	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME TIGGS OBOTTO SAMBOL GOLOD		O DEDTIL OF CACING DRILLING DATE				
AGE	IST		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND				
DEPTH BELOW SURFACE AND	LEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION				
20.	.3				(14)		╁					
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	1						1					
	]						]					
							]					
	4						1					
	4						1					
	4						1					
25 15.	5	25.0				Silt With Sand (ML)	+	<del>,,,,</del>				
			1.3	SS-1	3-5-8	25.0-26.3' - gravish orange. (10YB 7/4), moist, stiff.	$\parallel$					
	+	00.5	1.3	33-1	(13)	rapid dilatancy, mild to moderate HCl reaction, 15-20% fine to medium sand, 10% coarse sand to	$\mathbb{L}$					
	+	26.5				fine gravel-sized limestone fragments, all carbonate	$\mathcal{T}$					
	┪						1					
	1						1					
							1					
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							1					
30 10.	بإ	30.0				Silt With Sand (ML)	4.					
10.	۱۰۰			00.0	3-4-11	30.0-30.9' - Same as 25.0-26.3'	$\parallel$					
	4		0.9	SS-2	(15)		╫	<del>                                      </del>				
	+	31.5					+					
	┪						1					
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	1						1					
	1						1					
35	5	35.0 35.1	0.0	SS-3 /	50/1	No Recovery 35.0-35.1'	$\bot$	Install HW casing to 35'				
5.3	ئ ا	JO. I			(50/1")	Begin Rock Coring at 35.0 ft bgs See the next sheet for the rock core log	1					
	$\dashv$					See the next sheet for the rock core log	+					
	$\dashv$						+					
	$\exists$						+					
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	]						]					
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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723110.0 N, 458176.7 E (NAD83)

ELEVATION: 40.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 4.0 ft bgs on 04/20/07 START: 6/15/2007 END: 6/15/2007 LOGGER: J. Townes DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS 5.3 Begin NQ coring; first run Limestone R1-NO 1 35.0-35.9' - pale reddish brown, (10R 1.5' to set stroke 33 1.5 ft 5/4), very fine to fine grained, 35.72' - Fracture, 52 deg, rough, undulating, 60% moderate HCl reaction, very weak NR R1: Run time not recorded minor recrystallization, 3/16" open, rock, 36.5 (R1), voids up to 1/16" over 85% of rubble at top of run 0.2" thick SC-1 collected at 36.1surface, 10% irregular cavities (up to 0 9/16"x3/4"), minor recrystallization, some with fossil casts/ fossil molds, moderately fossiliferous 1 37.85' - Fracture, 65 deg, rough, undulating, No Recovery 35.9-36.5 open 3/16" 36.5-40.1' - Same as 35.0-36.5 R2-NC except fewer irregular cavities, 5% 5 ft 63 1 cavities, most with fossil cast/molds. 39.0' - Fracture, 75 deg, rough, undulating, 72% open 1/16", minor carbonate recrystallization cavities up to 3/16"x3/8", two larger cavities 1-3/16"x3/8", moderately 1 40 39.75' - Fracture, 75 deg, rough, undulating,  $0.3^{-}$ fossiliferous open 1/16" No Recovery 40.1-41.5' R2: 2 minutes NR 41.5 Limestone 41.7-42.0' - Fracture (2), horizontal, smooth, 41.5-43.0' - moderate yellowish brown, (10YR 5/4), fine to medium 3 undulating, open 3/16" 42.45' - Fractures, horizontal, rough, grained, mild to moderate HCI >10 undulating, open 3/8" reaction, extremely weak (R0), voids 42.75-43.0' - Fracture zone up to 1/16" over 40% of surface. a few subangular rock (gray) clasts up to 3/16"x3/16", poorly to moderately fossiliferous casts/molds, few black R3-NQ 5 ft 30% 8 organic inclusions, most 1/16"-1/8", NR 45 one inclusion 1"x3/8" 4 7 No Recovery 43.0-46.5' R3: 1 minute 46.5 Limestone 46.6' - Fracture, 45 deg, rough, undulating, 46.5-48.0' - moderate yellowish 2 open brown, (10YR 5/4), fine to medium 46.95' - Fracture, 35 deg, rough, undulating, grained, moderate HCI reaction, open 3/4", minor carbonate recrystallization 3 extremely weak (R0), some voids 47.7' - Fracture, horizontal, rough, undulating, with fossil mold/casts, voids up to open 1/16", tight 2 1/16"x1/16" covering 100% of R4-NC 48.0' - Fracture, horizontal, rough, undulating, surface; 5% subangular, gray, rock 5 ft 15 open 3/8" 48% clasts up to 3/16"x3/16", poorly to 48.35' - Fracture, horizontal, rough, moderately fossiliferous undulating, open 1/16", slightly tight 48.55' - Fracture, 50 deg, rough, undulating, 50 48.0-48.9' - Same as 41.5-43.0' NR except very few organic inclusions open No Recovery 48.9-51.5' R4: 1 minute 51.5 Limestone 2 51.5-53.0' - moderate yellowish 52.0' - Fracture, 30 deg, smooth, planar brown, (10YR 5/4), fine to medium 52.35' - Fracture, horizontal, smooth, planar grained, mild to moderate HCI 52.6' - Fracture or mechanical break, reaction, extremely weak (R0) 5 horizontal, rough, undulating 52.7' - Mechanical break, horizontal, rough, 53.0-54.0' - Same as 51.5-53.0' except 2% black staining R5-NQ undulating 5 ft 14 3 52.95, 53.1' - Fractures (2), horizontal, rough, 72% undulating 0 55



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723110.0 N, 458176.7 E (NAD83)

ELEVATION: 40.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

ORIENTATION: Vertical

WATER	LEVELS: 4.0	ft bg	s on 04	1/20/07 START : 6/15/2007 END : 6	/15/200	7 LOGGER : J. Townes	
≩Q⊋	(%			DISCONTINUITIES	_ g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-14.7 - -	56.5		NR	53.4' - Fractures, 50 deg, rough, undulating, minor carbonate recrystallization, open 1/16" 53.7' - Mechanical break 54.45' - horizontal, rough, undulating, tight 54.95' - Fracture, <90 deg, rough, undulating		Limestone  54.0-55.1' - light brown, (5YR 6/4), fine to medium grained, mild HCl reaction, weak (R2), voids (<1/16") over 85% of surface, poorly to	R5: 3 minutes
-			3	56.7' - Fractures, horizontal, rough, undulating, tight, open 1/16" 57.05' - Fractures, horizontal, rough,	掛	moderately fossiliferous, irregular voids up to 9/16" over 2% of surface No Recovery 55.1-56.5'	
-	R6-NQ		4	undulating, open 1/16" 57.4' - Fractures, horizontal, rough, undulating, open 3/8", minor black organic		Limestone 56.5-58.6' - moderate yellowish brown, (10Y 5/4), fine to medium	
- 60_ -19.7 -	5 ft 42%	27	NR	laminae 57.6, 57.7, 57.8' - Fractures (3), horizontal, rough, undulating, abundant black organic laminae 58.0' - Fracture, horizontal, rough, undulating, open 3/4", small black laminae		grained, mild to moderate HCI reaction, very weak to weak (R1 to R2), voids <1/16" over 90% of surface, poorly fossiliferous. irregular cavities up to 3/16" over 10% of surface, black organic inclusions, angular, up to 3/8", black laminae prominent from 57.8-58.7'.	R6: 2 minutes
-	61.5		0			No Recovery 58.6-61.5' Limestone 61.5-62.0' - grayish pink, (5R 8/2), very fine to fine grained, moderate	
-	D7.NO		3	62.8' - Fracture or bedding plane, 10 deg, rough, undulating, open 3/8" 63.15' - Fractures, horizontal, rough,		HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 50% of surface. irregular cavities up to 2"	
- -	R7-NQ 5 ft 97%	63	2	undulating, open 2" 63.5' - Fractures, 5 deg, rough, undulating, open 3/8"		over 10% of surface. poorly fossiliferous 62.0-64.3' - moderate reddish orange, (10R 6/6), very fine to fine	
65 -24.7 -			2	63.9' - Fractures, horizontal, rough, undulating, minor recrystallization 64.15' - Bedding plane, horizontal, rough,		grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), voids <1/16" over 50% of	R7: 4 minutes
- - -	66.5		2 NR) 1	undulating 64.8' - Bedding plane, horizontal, rough, undulating, open 3/4" 65.1' - Fractures, rough, undulating, minor recrystallization		<ul> <li>surface, single black organic layer at 62.6', 1/16" thick; trace organics above and below.</li> <li>64.3-64.9' - Same as 61.5-62.0' except more cavities, up to</li> </ul>	
-			2	65.7' - Fractures, 5 deg, rough, undulating 66.1' - Fracture, horizontal, rough, undulating, open 1-3/16" 66.95' - Fracture, horizontal, rough,	H	9/16"x9/16" over 20% of surface. - 64.9-66.35' - Same as 62.0-64.3' except more voids <1/8" over 70% of	
- -	R8-NQ 5 ft 100%	80	2	undulating, open 3/8", minor recrystallization 67.7' - Fractures, 60 deg, rough, undulating, minor recrystallization		surface No Recovery 66.35-66.5' Limestone 66.5-67.0' - moderate reddish	
70 <u> </u>			1	68.4' - Bedding plane, 5 deg, rough, undulating 69.05' - Fracture, 30 deg, rough, undulating, minor recrystallization	$\boxplus$	<ul> <li>orange, (10R 6/6), fine grained,</li> <li>moderate HCl reaction, very weak</li> <li>(R1), voids over 10% of surface,</li> </ul>	SC-2 collected at 69.78- 70.58' R8: 4 minutes
_	71.5		2	69.3' - Fracture, horizontal, rough, undulating, open 2" 69.7' - Fracture, horizontal, rough, undulating,	掛	trace organic black material, 66.5-67.0' non fossiliferous layer 67.0-68.0' - Same as 66.5-67.0' except poorly to moderately	
-			>10	minor recrystallization 70.6, 71.3' - Mechanical break (2) 72.2' - Fractures, horizontal, rough, undulating, minor recrystallization		fossiliferous. mottled and layered areas with grayish pink limestone, weak (R2) over 5% of surface area. 68.0-68.4' - Same as 66.5-67.0'	
- - -	R9-NQ 5 ft 86%	51	1	72.5-72.9' - Fracture zone, rubble, minor recrystallization 73.35' - horizontal, rough, undulating, tight 73.5' - Fractures, 60 deg, rough, undulating,		68.4-69.3' - Same as 67.0-68.0' 69.3-70.85' - Same as 61.5-62.0' 70.85-71.5' - Same as 62.0-64.3'	
75				minor recrystallization			



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723110.0 N, 458176.7 E (NAD83)

ELEVATION: 40.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION: Vertical

WATER	LEVELS: 4.0	ft bg	s on 04	4/20/07 START : 6/15/2007 END :	6/15/2	2007	LOGGER : J. Townes	
≥∩ ≘	- (%			DISCONTINUITIES			LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLICLIOS	3	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI ATIO	TRU STH,	(%) Q	FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	ğ	2	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
ER S	ECC	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	s   #		AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-34.7	075	ď	1	THIORNAL GO, GOTA FIGE GIVENING, FRANCE FIGURE	σ <i>σ</i> .	9		
-34.7			>10	75.3-75.7' - Fracture zone, rough, irregular,	上	1	Limestone 71.5-72.1' - grayish pink to moderate	
_				minor recrystallization	┵	4	reddish orange, (5R 8/2 to 10R 6/6),	R9: 2 minutes
_	76.5		NR		$\Box$	4	moderate HCl reaction, weak (R2), poorly fossiliferous, voids over 5% of	_
l _			>10	76.5-77.0' - Fracture zone	Д		surface	_
l _			- 10	77 41 Facetone	$\perp$	L	72.1-75.8' - moderate reddish orange, (10R 6/6), moderate HCl	_
_			>10	77.4' - Fracture zone, 20 deg, rough, undulating, minor recrystallization		I	reaction, amount of voids varies in	_
			/10	78.2-78.4' - Fracture zone			alternating 1' thick layers, voids range from 10-90%, irregular cavities	
	R10-NC		- 10		$\mathbb{H}$	+	throughout, up to 9/16"x9/16" over	
_	5 ft 75%	46	>10	78.9-79.1' - Fracture zone	Ъ	4	40% of surface, poorly fossiliferous No Recovery 75.8-76.5'	l -
80			2		Ъ	₫	Limestone	<u> </u>
-39.7	1		<u> </u>	80.1' - Fractures, 60 deg, rough, undulating,	$\dashv$	╁	76.5-80.25' - moderate reddish	_
-			NR	two intersecting fractures	甘	丰	orange, (10R 6/6), moderate HCl reaction, very weak (R1), voids over	R10: 2 minutes
-	81.5		INK		H	士	80% of surface, irregular cavities up	-
-	01.5				+	╬	to 9/16" over 20% of surface No Recovery 80.25-81.5'	-
-			1		$\Box$	╬	Limestone	-
-				82.2' - Mechanical break, horizontal, rough, undulating	Ш	╅	81.5-86.45' - moderate reddish orange, (10R 6/6), fine to medium	-
-			2	82.8' - Fractures, 30 deg, rough, undulating,	+	+	grained, moderate HCl reaction, very	-
-	R11-NC			open 3/8", organic material 83.1' - Fractures, rough, undulating, surface	+	ᅪ	weak (R1), voids <1/16" over 80% of surface, irregular cavities up to 3/8"	-
-	5 ft	44	1	open 1-9/16", minor recrystallization	$\pm$	╁	over 20% of surface, some voids and	-
-	99%			83.9-84.0' - Fracture zone, horizontal, undulating, organics	$\perp$	4	cavities contain fossil casts/molds,	-
85 <u>-</u> -44.7			>10	84.5-85.6' - Fracture zone, 3/8"-3-1/8" long	$-\Box$	4	trace, black organics throughout,  fossil and organics especially	_
				rock fragments	$-\Box$	╬	prevalent from 83.0-84.0'.	R11: 2 minutes
_			>10		+	+		KTT. 2 minutes
_	86.5		NR/	86.05' - Fracture zone, 60 deg, rough,		1	No Recovery 86.45-86.5'	Delling and add at 40:00
_			()	recrystallization	/	L	Bottom of Boring at 86.5 ft bgs on	Drilling ended at 13:00 hours; grouting completed -
_					4	L	6/15/2007	at 17:00 hours
-					1	L		Total depth is 86.5'
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ORIENTATION: Vertical

#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724033.5 N, 457716.3 E (NAD83)

CORING METHOD AND EQUIPMENT: Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER LEVELS: 5.17 ft bgs on 9/13/07 START: 8/23/2007 END: 9/7/2007 LOGGER: R. Bitely, C. Sump, T. Borton, J. Burkard, J. Townes DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 90 DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD SYMBOLIC MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS 204.0 204.0-204.7' - Fracture zone, multiple Boring AD-1 blind drilled to Limestone >10 intersecting fractures, gravel-sized fragments 204.0-206.5' - yellowish gray, (5Y approximately 204 feet 7/2), very fine to medium grained, below ground surface 205 <3" diameter R1-HQ 204.7, 204.9, 205.1, 205.3' - Fractures (4), <10, 80, <10, and <10 deg, rough, -163.0 mild to moderate HCI reaction, before beginning 2.5 ft 24 extremely weak (R0), with areas of 1" diameter weak (R2) rock, voids over sampling/logging.
Water level is based on 4 100% undulating, intersecting fractures 205.9-206.5' - Fracture zone, rough, 40% of surface, trace laminations. Ground Water Monitoring >10 undulating, fragments <2" diameter 206.5-207.15' - Fracture zone, rough, undulating, multiple intersecting fractures, 206.5 at LNP site (FSAR Table fossiliferous, medium strong to >10 strong (R3 to R4) from 204.0-204.2', 2.4.12.08)" 08/22/07 HW casing set to HCI reaction 1-3 seconds gravel-sized fragments <2" diameter 207.3, 207.4, 207.55, 207.6, 207.9, 208.15' -204.25' below ground R2-HQ >10 206.5-208.5' - yellowish gray, (5Y 2.5 ft 0 7/2), very fine to medium grained, surface 80% Fractures or mechanical break (6), <10 deg, extremely weak to very weak (R0 to 08/23/07 Begin rock coring >10 undulating, smooth to rough, bedding planes R1), 206.5-207.15': light olive gray **HQWL** NR 208.15-208.5' - Fracture zone, gravel-sized (5Y 5/2), high organic content; slow, Use thick mud mix with 209.0 fragments <2" diameter moderate HCI reaction, trace strong 250-350 rpm rotation 209.0-209.4' - Fracture zone, rough, organic odor, 207.15-208.5': R1: 4 minutes NA undulating, gravel-sized fragments <2" 204-204.2': Probable sluff laminated with trace organics in 210 laminations, <10% voids over fallen to bottom of borehole -168.0 NA during sonic advancement 209.4-210.6' - Sandy silt interval, friable surface No Recovery 208.5-209.0' R2: 3 minutes Limestone R3-HO 209.0-209.4' - yellowish gray, (5Y 0 5 ft 32% 7/2), very fine to fine grained, medium strong to strong (R3 to R4), R3: 6 minutes NR voids <1/16" over <20% of surface, poorly fossiliferous, trace laminations, trace organics 08/26/07 Switch drill rigs Sandy Silt (ML) and crew: Boart Longyear 209.4-210.6' - yellowish gray, (5Y 7/2), moist to dry, hard, strong HCl BL300T drill rig operated by Minnesota crew. 214.0 214.0-214.7' - Fracture zone, angular reaction, >60% low to moderate >10 limestone fragments 2-3" Úsing HW casing plasticity carbonate fines, <40% fine previously set.
Using face discharge type 215 214.7-215.3' - Fracture zone, fragments <1" -173.0 to medium grained carbonate sand, diameter trace H<sub>2</sub>S odor >10 215.3-217.1' - Fracture zone, fragments No Recovery 210.6-214.0' C. Sump takes over range from 1/2" to >3" in zones Limestone Fragments logging. R4-HQ 214.0-215.3' - yellowish gray, (5Y 7/2), slow moderate HCl reaction, >10 5 ft 8 76% weak (R2), 2-3" fragments from 217.0, 217.5' - Mechanical break (2), rough, 3 214.0-214.7' decreasing to <1" from undulating 214.7-215.3', voids 1/16-1/8" over 217.8' - Fracture, horizontal, rough, 15-25% of surface R4: 7 minutes undulating, possible bedding plane NR **Limestone And Limestone** Fragments 219.0 215.3-219' - yellowish gray, (5Y 7/2), 219.0' - Fracture or mechanical break, fine grained, slow moderate HCI horizontal, rough, undulating 219.4' - Fracture, rough, stepped 3 reaction, extremely weak to very 220 weak (R0 to R1), finely laminated (<1/16"), thin zone (217.0-217.1') of 178.0 219.7' - Bedding plane, horizontal, rough, bedding plane fracture 2 220.2, 220.5' - Fractures (2), rough, medium strong (R3) rock fragments, fine grained laminated material undulating, ends of single full core piece 220.5-222.0' - Fracture zone R5-HC appears argillaceous 13 >5 5 ft No Recovery 217.8-219.0' 60% Limestone 219.0-219.7' - Same as 215.3-217.8' NR R5: 13 minutes 224.0



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS : 5.1	7 ft b	gs on s	9/13/07 START: 8/23/2007 END: 9/	7/200	7 LOGGER: R. Bitely, C. Sump, T	Borton, J. Burkard, J. Townes
<b>≥</b> ∩≎	(%)			DISCONTINUITIES	စ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
225 -183.0 - - - - -	R6-HQ 5 ft 56% 229.0	8	1 0 0 NR	224.3' - Fracture, horizontal, rough, undulating, contact with very soft sandy silt carbonate material 224.3-225.1' - carbonate silt with gravel sized fragments (1/4-1/2") 225.1-225.7' - Fracture zone, very weak limestone fragments 1-4"; full core piece laminated, easily parted on bedding plane fractures 225.7-226.8' - Fracture zone, limestone material with fragments		Limestone And Silty Sand  219.7-222.0' - mild to moderate HCI reaction, with gravel-sized limestone fragments, very fine to fine grained fragments are fossiliferous (casts and molds up to 1/2" diameter over 10-15% of surface), voids (1/16-1/8") over 15-20% of surface, larger fragments and full core diameter zones medium strong to very strong (R3-R5), small fragments (<1") weak (R2)  No Recovery 222.0-224.0'  Limestone  224.0-226.8' - yellowish gray, (5Y	R6: 10 minutes
230 -188.0 - - - -	R7-HQ 5 ft 48%	0	NA NA NA	229.0-229.55' - Fracture zone, limestone fragments, 3/4-2", weak (R2), fine oxidation staining on fracture surfaces 229.55-230.2' - Extremely weak rock fractured into sand/gravel sized carbonate material 229.8' - Mechanical break, horizontal, rough 230.2-230.4' - Fracture zone, more competent limestone fragments, angular, fine grained, 1/4-1" diameter 230.4-231.4' - Extremely weak material, same as 229.55-230.2'		7/2), fine grained, mild to moderate HCl reaction, extremely weak to very weak (R0 to R1), voids (1/16") over <1-5% in zones, trace fossil casts/molds (<1%), larger fragments tend to be more competent, 225.6-226.1' medium strong (R3), extremely weak (R0) zones, friable, trace bedding (laminae 1/16-1/8"), recurring sequence of thin (6") more competent limestone beds separated by extremely weak very fine grained silt-sized carbonate material No Recovery 226.8-229.0'	
- 23 <u>5</u> -193.0 - - - -	234.0 R8-HQ 5 ft 32%	0	NA NA NR	234.0-234.7' - Fracture zone, limestone fragments 1/2-2" in size, weak to medium strong (R2-R3) 234.7' - Horizontal contact with silty, sandy fine gravel-sized limestone fragments		Limestone Fragments 229.0-229.2' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to moderate HCI reaction, weak (R2), 3/4"-2-1/2" fragments, fossiliferous with fossil molds/casts over 20% of surface, voids (1/16-1/8") over 15% of surface 229.2-229.5' - Same as 229.0-229.2' except strong (R4), thin, fine-grained bed, trace voids (1/16"), very fine (<1/32") black inclusions (possibly pyrite) Limestone 229.5-229.9' - yellowish gray, (5Y 7/2), very fine to fine grained, weak	R8: 13 minutes
-198.0 -198.0 - - - - - -	R9-HQ 5 ft 36%	8	>10 2 NR	239.0-239.7' - Fracture zone, limestone fragments 1" to 2-1/2" diameter 239.7' - Fracture, horizontal, rough, undulating, chipped fracture face 240.0, 240.4' - Mechanical break (2), horizontal, smooth, planar		(R2), voids (1/16") over 40-50% of surface, larger cavities up to 1/2" over 5-10%  Sity Sand Sized Material (SM) 229.9-231.4' - with gravel-sized very weak (R1) limestone fragments similar to 224.0-226.5' No Recovery 231.4-234.0' Limestone Fragments 234.0-234.7' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCI reaction, weak to medium strong (R2 to R3), small voids (1/16-1/8") over 10-15% of surface, trace small fossil molds (<3/8")	



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SHEET 3 OF 17

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.17 ft bgs on 9/13/07 START: 8/23/2007 END: 9/7/2007 LOGGER: R. Bitely, C. Sump, T. Borton, J. Burkard, J. Townes DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD SYMBOLIC MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS 244.0': Slightly improved recovery/RQD after mixing 244.0-244.6' - Mechanical break, 1-2 Silt (ML) >10 Limestone core pieces and fragments, mostly 234.7-235.6' - yellowish gray and dark olive gray in alternating mottled bands, (5Y 7/2 and 5Y 3/2), horizontal, rough, undulating fracture faces; new batch of mud 245 -203.0 extremely weak rock moderate to strong HCl reaction, extremely weak (R0), finely laminated, all carbonate material 244.6, 245.1' - Bedding plane (2), horizontal, 3 rough, undulating, fractures on intact core R10-HQ pieces >10 No Recovery 235.6-239.0' 245.2, 245.9' - Fractures or mechanical break 20 5 ft (2), rough, undulating, very weak rock 245.9-246.2' - Fracture zone, 1/4-3/4" 50% Limestone 239.0-240.8' - yellowish gray, (5Y fragments (very weak) 246.2-246.5' - Fractures (2), rough, 7/2), fine grained, strong HCl reaction, extremely weak (R0), finely laminated (1/16-3/16"), <5% fine black inclusions (<1/16"), 1/4" thick NR undulating, on either end of single core piece R10: 8 minutes of very weak (R1) limestone 249.0 more competent bed at 239.9' (very weak -R1) No Recovery 240.8-244.0' 3 249.4' - Fracture, 10 deg, rough, undulating 249.5' - Fracture or mechanical break, 60-70 250 Limestone 244.0-246.5' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak -208.0 deg, rough, undulating >10 249.6' - Fracture, horizontal, rough, 250.0': Not re-circulating (R1), voids (1/16") over 10-20% of undulating, contact with finer grained mud surface, variable in zones, trace R11-HO limestone 4 fossil molds (<1/2"), light olive gray 24 5 ft 58% 249.6-250.4' - Fracture zone, limestone (5Y 5/2) thinly laminated zones up to fragments 1/2-3/4" thick up to 3" diameter 1/4" thick spaced 1-2" apart over 250.4, 250.9' - Fractures or mechanical break 244.6-245.1' (2), horizontal, rough, undulating No Recovery 246.5-249.0' 251.1' - Disk-shaped discontinuity with finer NR Limestone grained limestone below, brown staining on R11: 10 minutes 249.0-249.4' - yellowish gray, (5Y surface 7/2), fine grained, strong HCI 251.2, 251.35' - Bedding plane (2), 254.0 reaction, very weak (R1), pitted surface, <1/16" dark brown horizontal, bedding plane fractures >10 251.4' - Fracture, 10 deg, rough, undulating, laminations, many with 1/2" relief 255 stepped, crosses bedding planes 249.4-251.9' - yellowish gray, (5Y 7/2), fine grained, strong HCl 254.0-254.7' - Fracture zone, 30% limestone fragments 1/2-3/4" in size, single 4" half core -213.0 >10 reaction, weak to medium strong (R2 diameter with vertical rough undulating to R3), voids (1/16") over surface fracture or mechanical break, remaining R12-HQ variably <5-10% in thin zones, larger >10 fragments 1-2" diameter 35 5 ft cavities/fossil molds up to 1/2' 96% 255.1' - Fracture, horizontal, rough, variable from trace to 5%; thinly undulating bedded (1/2-3/4") at 249.6-250.4', 255.4' - Fracture or mechanical break, 2 horizontal, rough, undulating, stepped, 1/2" 255.6-255.8' - Fracture zone, 1/2" thick very fine grained thin beds (<2") with no voids/fossils 251.2-251.5', very R12: 8 minutes fine black inclusions (<1/16") over >10 bedding plane parting 255.8, 256.2' - Bedding plane (2), horizontal, smooth, bedding plane partings 1-2% 259.0 NR No Recovery 251.9-254.0' **Limestone** 254.0-258.8' - yellowish gray, (5Y 256.2-256.6' - Fracture zone, similar to 2 255.6-255.81 260 7/2), strong HCl reaction, very weak -218.0 256.9, 257.1' - Bedding plane (2), horizontal, (R1), medium density, alternating rough, bedding plane partings >10 zones of very fine grained and fine 257.8' - Fracture or mechanical break, 70-80 grained, voids (1/16") occur in R13-HQ horizontal zones up to 25% of 257.9-258.4' - Fracture zone, fragments 1-2" 0 5 ft surface, fossil molds and casts up to in length 44% 1/2" in discrete zones 1/2-1" thick 259.0-259.4' - Coarse carbonate sand No Recovery 258.8-259.0' 259.4-259.6' - Fractures (2), horizontal, NR rough, undulating, single full-core diameter. limestone, fracture faces on both ends R13: 7 minutes 264.0



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT: Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical

WATER	LEVELS : 5.1	7 ft b	gs on 9	)/13/07 START: 8/23/2007 END: 9	/7/200	7 LOGGER : R. Bitely, C. Sump, T	. Borton, J. Burkard, J. Townes
≥0£	<u> </u>			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
265 -223.0 - - - - -	R14-HQ 5 ft 0%	0	NR	259.6-261.2' - Fracture zone, limestone fragments 1/2" to 1-1/2" with 20% sand and fine gravel material		Limestone  259.0-261.2' - Same as 254.0-258.8' except extremely weak (R0), fractured during drilling process into silty sand/gravel-sized material No Recovery 261.2-269.0'	264.0': Driller's Remark:  No loss of torque Tag bottom of hole at 268.5' Bit clear Mud pump on low (6 - 8 gallons per minute) Sand-sized limestone material in previous run - possible washout
	269.0		40	269.0-269.6' - Fracture zone, limestone	F	Limestone Fragments	-
270_			>10	fragments; 1/2-2" diameter, <5% fines (sand-sized)	Ē		
-228.0			>10	269.6-270.1' - Fracture zone, sandy gravel sized material	世	medium gravel-sized fragments - range in size from 1/4-2", fragments	_
-	R15-HQ			270.1' - Discontinuity with competent limestone, weak rock (R2)	世	exhibit voids (1/16-1/8") over 10-25% of surface, cavities (up to 3/4")	-
- - - -	5 ft 32%	0	NR	270.3' - Fracture or mechanical break, horizontal, undulating, bedding plane fracture 270.6' - Mechanical break		variable from trace to 15% Clayey Silt (ML) 269.8-270.0' - slow strong HCl reaction Limestone 270.0-270.6' - yellowish gray, (5Y 7/2), fine grained, strong HCl	R15: 11 minutes
	274.0			274.0-274.2' - Fracture zone, 3/4-1"	+	reaction, extremely weak (R0), medium density, thinly bedded (1-2")	-
275			>10	limestone fragments 274.2, 274.5, 274.7' - Bedding plane (3),	+	with fine laminations (<1/16") between beds, voids (1/16") up to	-
-233.0			>10	horizontal, smooth, planar, bedding plane fractures	Ē	30% in discrete horizontal zones 1/2" thick	-
	 R16-HQ 5 ft	0	>10	274.7-275.1' - Fracture zone, 3/4" to 1-1/2" fragments 275.2' - Fracture or mechanical break,	盐	No Recovery 270.6-274.0' Limestone - 274.0-275.8' - yellowish gray, (5Y	-
	62%			vertical, rough, undulating 275.4' - Contact between fractured limestone	士	7/2), very fine grained, strong HCl reaction, extremely weak to very	-
- - -			NR	above and very weak limestone below 275.6-276.2' - Fracture zone, 1/4" to 1-1/2" fragments 276.2-277.1' - Fracture zone, limestone		weak (R0 to R1), voids (1/16") over     5% of surface concentrated in     discrete horizontal zones (bedding     plane fractures)	R16: 10 minutes
-	279.0			fragments 3-4" with sandy fine gravel sized pieces at end	世	Limestone Fragments 275.8-276.1' - very fine grained, with	-
280 -238.0			>10	279.0-280.7' - Fracture zone, 80% fragments 3/4" to 1-1/2", few larger fragments up to 3", undulating fracture surfaces	井	1" thick bed of greenish gray (5G 6/1) limestone, very strong (R5), numerous cavities up to 7/8" on one	
-230.0			>10	and and an action	士	<ul> <li>side of bed (cannot determine bed</li> </ul>	-
- - - -	R17-HQ 5 ft 34%	0	NR			orientation) Limestone 276.1-277.1' - yellowish gray, (5Y 7/2), fine to medium grained, mild HCl reaction, medium strong (R3), voids (1/16") over 15% of surface, larger cavities up to 1" over 10-15% of rock No Recovery 277.1-279.0'	R17: 13 minutes
	<u> </u>						



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION : Vertical

DISCONTINUITIES  DESCRIPTION  DESCRIPTION  DESCRIPTION  DESCRIPTION  DESCRIPTION  DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGH PLANARITY, INFILLING MATERIAL A THICKNESS, SURFACE STAINING, AND TI  284.0-285.65' - Fracture zone, 70% fragments 1-3" in size, 30% 1/2-1"	AND ≝	LITHOLOGY  ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	COMMENTS SIZE AND DEPTH OF CASING,
284.0-285.65' - Fracture zone, 70% >10 fragments 1-3" in size, 30% 1/2-1" in s	HNESS, AND	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING
284.0-285.65' - Fracture zone, 70% >10 fragments 1-3" in size, 30% 1/2-1" in s	HNESS, AND WAR		
284.0-285.65' - Fracture zone, 70% >10 fragments 1-3" in size, 30% 1/2-1" in s	AND B	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
284.0-285.65' - Fracture zone, 70% >10 fragments 1-3" in size, 30% 1/2-1" in s		AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
>10   fragments 1-3" in size, 30% 1/2-1" in s	IGHTNESS 6	CHARACTERISTICS	·
	size _	Limestone Fragments - 279.0-280.7' - yellowish gray, (5Y	284.0-286.5': Note core barrel plugged after coring -
285 thinly bedded (1/4" thick) smaller fragi		7/2), fine grained, strong HCl	2.5 feet. Pulled barrel and
-243.0 fragments exhibit bedding plane partir	ngs —	reaction, very weak to weak (R1 to	core, then cored second
>10   285.65' - Fracture, 5 deg, smooth, with	h black	<ul> <li>R2), trace voids (1/16") over surface, fossil molds and casts over 10-15%</li> </ul>	2.5 feet with clean barrel Upper portion of second
R18-HQ staining		surface of most fragments, 90% of	run indicates material fell
- 5 ft   22   >10   286.1' - Fracture or mechanical break horizontal, rough, undulating	·, -	- fossil molds <3/8" in longest dimension, few molds up to 3/4",	out of 1st run (cored twice). – Combined cores for 5 foot
286.1-286.4' - Fracture zone, 1/2-2"		fragments from 279.0-279.1' contain	interval.
- 3 fragments	🛨	only trace fossils (casts and molds)	-
286.4' - Fractures, 45 deg, rough, und intersecting fracture set (end of full co		and exhibit smooth bedding plane fractures	R18: combined run time:
diameter limestone)		No Recovery 280.7-284.0'	15 minutes –
289.0 286.85' - Fracture or mechanical brea deg, rough, undulating	ak, 45	Limestone 284.0-284.3' - yellowish gray, (5Y	
	ulating 🞞	7/2), fine grained, moderate HCl	]
290 287.7' - Fracture, 5 deg, rough, undula	ating,	reaction, medium strong (R3), HCl	
-248.0   soft material   287.9' - Fracture, horizontal, rough,	F	reaction on fresh (powdered) surface Limestone Fragments	
undulating, stepped (1/4" relief)		284.3-284.7' - yellowish gray, (5Y	
R19-HQ 289.0-289.15' - Fracture zone, fragme to 1-1/2"	ents 3/4"	7/2), fine grained, weak (R2), very mild HCl reaction, moderate where	_
5 ft   7   10 1-1/2"   289.15' - Silty sand material on fractur	re 🎞	pulverized, 5-10% voids (1/16") over	1
surface of full core diameter limestone		surface, fossil molds and casts	-
NR 289.6' - Fracture, 10 deg, undulating, rough	very _	_ 1/4-3/4" over 25% of surface 284.7-285.7' - yellowish gray with	-
289.7-290.1' - Fracture zone, fragmen	nts 1-3"	light gray mottling, (5Y 7/2 and N7),	R19: 11 minutes
in size 290.15-290.4' - Fractures (2), horizont	tal 💾	fine grained, 50% fragments exhibit thin bedding plane partings (1/4-1/2"	-
294.0 rough, undulating, fractures on both or		thick), light gray clayey seam at	SC-1 collected at 294.0-
1 of single core diameter limestone	-	284.7-285.0	294.91' -
295 290.4-290.7' - Fracture zone, 3/4-1" fragments with soft sandy material		<b>Limestone</b> — 285.7-288.1' - light gray, (N7), very	
290.7-291.1' - Fractures, undulating, p		fine to medium grained, moderate	_
fracture surfaces intersected by 45 de		HCl reaction, very weak to weak (R1 to R2), mostly weak (R2), with thin	_
R20-HQ   >10   fracture set	<b>`</b>	zones of weaker (R1) material, voids	
5 ft 18 >10 294.95 - Fracture, 45 deg, rough, und 294.95 - Fracture zone, 2-3"	dulating	(1/16-3/16") over 10-15% of surface,	]
fragments to 296.0' then rock become	es T	<ul> <li>larger cavities/fossil molds up to 1/2" diameter over 15-20% of surface</li> </ul>	]
extremely weak and fractures into silt,		No Recovery 288.1-289.0'	
NR and fine gravel sized pieces (<3/4")	1	Limestone And Limestone     Fragments	R20: 8 minutes
299.0	-	289.0-291.1' - yellowish gray, (5Y	
	🌣	<ul> <li>7/2), fine grained, strong HCl reaction on powdered surface, weak</li> </ul>	
2 299.25, 299.8' - Fractures or mechani break (2), horizontal, rough, undulatin		to medium strong (R2 to R3), voids	
300   break (2), norizontal, rough, undulating material	19, 3011	(1/16-1/8") over 15-25% of surface,	-
1 300.3' - Fracture, horizontal, with loos		trace cavities/fossil molds (up to 1/2"), extremely weak (R0) fractured	] -
material; top of dark black (organic) si	ilt clay	soft material 290.4-290.7': silty,	-
5 ft   29   >10   301.1' - Fractures (2), rough, undulating	ng,	sandy gravel-sized limestone material	_
78% vertical and horizontal intersecting fra	ictures,	No Recovery 291.1-294.0'	]
possible mechanical break >10 301.1-301.4' - Fracture zone, gravel s	sized 📙	1	
limestone fragments (1/4-3/4") with sil		[	]
sandy fines NR 301.7' - Fractures, vertical, rough, unc	dulating T		R21: 11 minutes
304.0 intersecting fracture set in 3-1/2" core		[	1



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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.17 ft bgs on 9/13/07 START: 8/23/2007 END: 9/7/2007 LOGGER: R. Bitely, C. Sump, T. Borton, J. Burkard, J. Townes DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD SYMBOLIC RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS 301.9-302.9' - Fracture zone, silty sandy Limestone And Limestone >10 material with gravel sized (1/4-3/4") **Fragments** limestone fragments (25%) 294.0-295.2' - yellowish gray to 305 304.0-304.7' - Fracture zone, extremely weak -263.0 grayish yellow, (5Y 7/2 to 5Y 8/4), strong HCl reaction, extremely weak >10 silt-sized material 305.1, 305.2, 305.35, 305.7' - Fractures or mechanical break (4), horizontal, slightly to very weak (R0 to R1), intact core from 294.0-294.9': finely laminated R22-HQ rough to smooth, weak rock, possible with darker laminae (1/16" thick) 9 >10 5 ft 91% spaced 1/2-1" apart bedding planes 305.7-305.9' - Fragments (1/2-1") 305.9-306.5' - Fracture zone, extremely Limestone Fragments 295.2-296.2' - Same as 294.0-295.2' except voids (1/16-1/8") over 5-10% 2 fractured zone slightly healed (intact core of surface, trace cavities up to 1/2" R22: 12 minutes 1 306.5-307.0' - Fracture zone, 1-3" fragments diameter NR 307.3, 307.6, 307.9, 308.0' - Fractures (4), 296.2-296.9' - Same as 294.0-295.2' 309.0 horizontal, rough, undulating, partially except moderate HCl reaction, stepped (1/4" relief) extremely weak (R0), fractured into >10 silty sandy gravel-sized material 25% gravel / 75% coarse to fine-grained 309.0-310.3' - Fracture zone, 3/4-3" 310 fragments -268.0 silt and sand-sized particles 1 No Recovery 296.9-299.0' 310.9, 311.2, 311.4, 312.1, 312.4, 312.6' -Limestone R23-H0 299.0-300.3' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), Fractures or mechanical break (6), 2 5 ft 76% 22 horizontal, rough, undulating moderate HCI reaction, extremely 3 weak (R0), fragments with preferred horizontal orientation (yellowish gray) with fine grained light olive gray R23: 11 minutes matrix material, fragments up to 1" in NR longest dimension, finely laminated 314.0 Clay (CL) 314.0-316.5' - Fracture zone, 1-3" limestone 300.3-300.5' - dark black, no HCl >10 fragments reaction, finely laminated, organic 315 -273.0 Limestone 300.5-301.9' - yellowish gray, (5Y 7/2), fine grained, extremely weak >10 (R0), dark gray/black blebs covering R24-HQ 5-10% of surface, dark brown 5 ft 20 >10 94% staining on few fracture surfaces 316.8' - Fracture, 45 deg, rough, undulating 301.9-302.9' - Same as 300.5-301.9' 317.0' - Fracture, 50 deg, rough, undulating, except fractured into silt and >10 gravel-sized limestone fragments 317.5' - Fracture or mechanical break, No Recovery 302.9-304.0 R24: 8 minutes horizontal, rough, undulating 2 Limestone 317.5-317.8' - Fracture zone, silty material 304.0-307.8' - yellowish gray, (5Y NR 319.0 with gravel sized fragments (3/4") 7/2), fine grained, slow strong HCI 318.1' - Fracture, 15 deg, rough, undulating reaction, extremely weak to weak 5 318.3' - Fracture or mechanical break, (R0 to R2), with dark gray blebs up to 320 horizontal, rough, undulating 319.3, 319.4, 319.6, 319.7, 319.85' --278.0 1/2" in size 307.8-308.55' - light olive gray, (5Y >10 Fractures (5), horizontal, rough, undulating, 5/2), strong HCl reaction, medium strong (R3), sharp contact with bedding plane partings 2-4" 320.2-321.8' - Fracture zone R25-H0 yellowish gray limestone above, 37 >10 5 ft finely laminated 307.8-307.9', voids 82% 321.8' - Contact with competent limestone 1/16" over 30-40% of surface, few 322.1' - Fracture, horizontal, stepped, (1/4" larger cavities up to 3/8" (<2%) 2 relief) No Recovery 308.55-309.0' 322.7' - Fracture or mechanical break. R25: 9 minutes horizontal, rough, undulating NR 324.0



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT: Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing

ORIENTATION: Vertical

WATER	LEVELS : 5.1	17 ft bo	gs on 9	9/13/07 START : 8/23/2007 END : 9/	7/2007	Z LOGGER : R. Bitely, C. Sump.	T. Borton, J. Burkard, J. Townes
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
325 -283.0 - - -	R26-HQ 5 ft 1 14%		>10	324.0-324.7' - Fracture zone, 1" to 1-1/2" fragments; 324.0-324.2' thin very weak fractured silty material		Limestone  309.0-311.5' - yellowish gray, (5Y 7/2), weak (R2), very strong HCl reaction, voids (1/16-1/8") variable  10-30% of surface concentrated in zones preferentially oriented along horizontal bedding planes  311.5-312.1' - Same as 309.0-311.5' except pale yellowish brown, (10YR 6/2)  312.1-312.8' - Same as 309.0-311.5' No Recovery 312.8-314.0' Limestone	Driller's Remark: No loss of torque during drilling; wash out fine soft material possible
-	329.0		>10	329.0-329.4', 330.4-331.15', 331.7-331.95' - Silt intervals		<ul> <li>314.0-318.7' - Same as 309.0-311.5' except more fragmented, color becoming pale yellowish brown (5YR 5/2) at 317.0'</li> <li>No Recovery 318.7-319.0'</li> </ul>	- - - -
330 <u> </u>			>10	329.6, 329.95, 330.4, 331.15, 331.5, 331.7,331.95' - Bedding plane fractures, mechanical breaks, or silt contacts (7), <10 deg, smooth to rough		Limestone 319.0-321.8' - pale yellowish brown with zones of yellowish gray, (5Y 5/2	
-	R27-HQ 5 ft 70%	19	>10	C.		with 5Y 7/2), strong HCl reaction, very weak (R1), grading to fractured material 320.2-321.8', voids (1/16") over 25-30% of surface, trace	C. Sump and R. Bitely logging -
-			0 NR			cavities up to 3/8" 321.8-323.1' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), finely	- R27: 7 minutes
_	334.0				H	laminated (1/16") 321.8-322.2	1
335_ -293.0			3	334.25, 334.6, 334.85, 335.15, 335.45, 335.65, 335.9, 336.25, 337.5, 338.3, 338.65' - Fractures (11), <10 deg, rough, undulating, bedding plane fractures or mechanical breaks, tight to <1/2" open		No Recovery 323.1-324.0' Limestone Fragments 324.0-324.2' - very light gray, (N8), fine grained, strong HCl reaction, strong to very strong (R4 to R5), voids/fossil molds (1/16-3/16") over 15-20% of surface	- - -
-	R28-HQ 5.5 ft 100%		1	336.5' - Mechanical break		Fractured Limestone 324.2-324.7' - yellowish gray, fine grained, very strong HCl reaction, extremely weak (R0), with fine	R28: 9 minutes
-			2			gravel-sized limestone fragments (1/4-1/2"), dark brown organic material (<2%) No Recovery 324.7-329.0'	SC-2 collected at 338.6- 339.4' -
-	339.5		0		日	Sandy Silt To Gravelly Silt (ML) 329.0-329.4' - yellowish gray, (5Y	6" of R29 at end of R28
340			>10		Ħ	7/2), moist, moderate to strong HCI	run; adjust R28 to 5.5' and R29 to 4.5' to
-298.0 _			>5	339.9, 340.1' - Fractures (2), <10 deg, smooth, undulating, bedding plane fractures or mechanical breaks		reaction, >50% silt with <50% limestone fragments as sand to gravel-sized fraction	accommodate
-	R29-HQ 4.5 ft   100%		2	340.1-340.75' - Fracture zone, rough, undulating, gravel sized fragments <3" diameter 341.35, 341.5, 341.65, 343.65' - Fractures or		329.4-330.4' - yellowish gray, (5Y 7/2), very fine to medium grained, moderate to strong HCl reaction,	-
-	.5576		2	mechanical break (4), <10 deg, rough, undulating, bedding plane fractures or mechanical breaks, tight to open <1/2"		extremely weak to very weak (R0 to R1), trace fossil fragments, strong organic odor	- R29: 7 minutes
	344.0		1	342.25-342.3' and 343.15-343.45' - Clay seams and silt seams			-



# **ROCK CORE LOG**

SHEET 8 OF 17

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION : Vertical

				IENT : DIELIICH D-120 3/N 620, BE3001 3/N 1317, IIIud I			ORIENTATION: Vertical
WATER	LEVELS : 5.1	7 ft b	gs on 9		7/2007		T. Borton, J. Burkard, J. Townes
≥∩₽	, (9			DISCONTINUITIES	၂ ပွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OUZE AND DEDTIL OF CASTIL
ᆱᆼ	RUN H, A	(%) 🛭	URE	DEDTH TYPE OPIENTATION POHOUNESS	<b>1</b> ∺ [	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
YFA YFA	ZE I	0	SCT F	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	₽BG	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SUF	COL	S.	FR/	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	-				++	Sandy To Gravelly Silt (ML)	Driller's Remark: 100%
-			1	344.4, 345.25, 345.5, 345.75, 346.0, 346.5,	₽	330.4-331.15' - Same as	circulation -
345				346.75, 348.3' - Fractures (8), 40 deg,	╀	329.0-329.4'	J. Burkard and C. Sump
-303.0			,	bedding plane fractures or mechanical		Limestone	logging SC-3 collected at 344.4-
1 7			4	breaks, smooth to rough, undulating	Н	331.15-331.7' - Same as 329.4-330.4'	345.25'
-	R30-HQ					Sandy To Gravelly Silt (ML)	
-	5 ft	77	2		╨	331.7-331.95' - Same as	-
-	100%				╁┼	329.0-329.4'	
			0		耳	Limestone	08/29/07 16:30 Stop drilling AD-1 for shift. –
			ľ		Н	331.95-332.5' - Same as 329.4-330.4'	Remove core barrel for
1 7					ш	No Recovery 332.5-334.0'	geophysical logging
-	040.0		1		╁┼	Limestone	R30: 7 minutes -
-	349.0				丗	334.0-339.5' - yellowish gray, (5Y	09/05/07 10:00
-			2		₩	7/2), very fine to medium grained,	Start drilling at the
350				349.6, 349.8' - Mechanical break (2), 10-30	旪	strong HCl reaction, very weak to  medium strong (R1 to R3), voids	beginning of the shift
-308.0			[ ]	deg, rough, undulating 350.2-351.7' - Fracture zone, rough,	$\Box$	<1/16" over <30% of surface, highly	
-			>10	undulating, multiple breaks with sharp	⇈	variable, trace bedding plane of 30	
-	R31-HQ			angular fragments, no visible orientation	口	deg, trace bedding plane 40 deg,	-
-	5 ft	50	>10		╁┼┼	trace inclusion clasts 339.5-340.05' - very light gray to	-
_	94%				Ħ	vellowish gray, (N8 to 5Y 8/1), very	_
			1		ш	fine to medium grained, strong HCI	
			'	352.7' - Fracture, 70-80 deg, rough,		reaction, extremely weak to weak	
1 7			0	undulating, tight	Н	(R0 to R2), highly variable, increasing organic laminations with	R31: 8 minutes
-			_		╁┼┼	depth to mildly to moderately	-
-	354.0		NR		₩	competent organic lens, olive gray to	-
_			1		╁┼	dark gray (5Y 4/1 to N3), very fine to fine grained, extremely weak (R0),	_
355_			•	354.6, 355.2, 356.0, 356.5, 357.5, 358.2,	Д	no apparent HCl reaction on organic	
-313.0				358.7, 358.8' - Mechanical break (8), horizontal to 10 deg, rough to smooth,	Н	material, mild reaction on limestone	
_			2	undulating	ш	in section, 10-20% limestone	-
-	R32-HQ				╁┼	probably due to boxing, limestone same as 340.05-344.0'	-
-	5 ft	95	1		廿	340.05-344.0' - Same as	-
-	100%				₽	339.5-340.5' except strong HCI	_
			1		Ш	reaction, very weak to weak (R1 to	
1 7					H	R2), trace voids <1/16" intermittent over surface, trace laminated	
					世	organics, variable hardness, variable	R32: 7 minutes
-	250.0		3		口	grain sizes, trace fossil structure,	-
-	359.0				╁┼	trace mottled coloration, silt seam at 342.25-342.3' and clay seam at	-
-			2		$\Box$	343.15-343.45', carbonate derived,	_
360_				359.7, 359.8, 361.2, 361.9, 362.0, 362.5,	$oldsymbol{++}$	_ friable, nonplastic silts and	
-318.0			امدا	363.1' - Mechanical break (7), horizontal to	Ш	moderately to highly plastic clays	
1 7			>10	15 deg, rough to smooth, undulating 360.3-360.7' - Horizontal bedding plane	H	344.0-349.0' - very light gray with yellowish gray mottling, (N8 and 5Y	1
-	R33-HQ			followed by a fracture zone composed of very	口	8/1), very fine grained, moderate to	
-	5 ft	60	2	weak (R1) rock fragments	╂┼╂	strong HCl reaction, very weak to	-
-	90%				丗	medium strong (R1 to R3), trace	-
_			4		H	voids <1/16" over surface, trace fossil casts, few cavities <1"x1/4"	
				362.7-363.1' - Fracture, 70-80 deg, rough,	Н	349.0-350.3' - yellowish gray, (5Y	
1 7			1	undulating, trace stain	Ш	8/1), fine grained, mild to moderate	R33: 7 minutes
-	264.0		NR		╁┼	HCl reaction, weak to medium strong (R2 to R3), few cavities <1"x1/4"	-
	364.0				$\Box$	(i.e. to ito), lew odvides \$1 x1/4	



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SHEET 9 OF 17

ORIENTATION: Vertical

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

CORING METHOD AND EQUIPMENT: Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER LEVELS: 5.17 ft bgs on 9/13/07 START: 8/23/2007 END: 9/7/2007 LOGGER: R. Bitely, C. Sump, T. Borton, J. Burkard, J. Townes DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS FRACTURES PER FOOT SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD SYMBOLIC RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS 350.3-351.0' - yellowish gray, (5Y 1 7/2), very fine grained, mild HCI 364.5, 365.0, 365.3, 365.6, 365.9, 366.3, 367.3, 367.6, 368.3' - Mechanical break (9), reaction, very weak to weak (R1 to R2), <1/16" thick laminar bedding 365 -323.0 horizontal to 10 deg, rough to smooth, 5 planes undulating 351.0-351.7' - yellowish gray transition to pale blue, (5Y 7/2 to 5B 6/2), fine grained, mild to moderate 364.6-366.5' - Silt-size particle infill R34-HQ 35 >10 5 ft 366.5-367.0' - Fracture zone, angular 98% HCl reaction, very weak to weak (R1 Driller's Remark: loss of fragments up to 1/2"x1" in size to R2), visible casts and molds circulation at 366.8' 351.7-353.7' - yellow gray, (5Y 8/1), fine grained, mild HCl reaction, very 2 weak to weak (R1 to R2), no casts or R34: 7 minutes 2 molds No Recovery 353.7-354.0' 369.0 NR Limestone 354.0-358.4' - very pale orange to 1 pale yellowish brown, (10YR 8/2 to 370 369.7, 370.3, 371.4' - Fractures (3), 10YR 6/2), fine to medium grained, horizontal to 40 deg, rough to smooth, -328.0 mild to moderate delayed HCI >10 undulating, no stain, no infill reaction, very weak to weak (R1 to 370.7-370.9' - Fracture zone, with clay size R2), moderately fossiliferous (casts and molds), <1/16" voids cover R35-H0 particle infill 55 1 5 ft 96% 20-50% of surface, solution cavities 1/8x1" 358.4-359.0' - yellowish gray, (5Y >10 372.4-373.4' - Fracture zone, top of zone 7/2), fine to very fine grained, along a smooth bedding plane, bottom moderate to strong delayed HCI R35: 7 minutes section is rough and undulating reaction, weak to medium strong (R2 >10 to R3), <1/16" voids covering <5% of 374.0 NR surface T. Borton and J. Burkard 374.2-374.5' - Fracture zone, no visible 359.0-361.3' - very pale orange, >10 logging (10YR 8/2), very fine to fine grained, moderate HCl reaction, very weak to orientation, gravels 1/2", angular to 375 subangular -333.0 weak (R1 to R2), trace voids 1/16" on surface, mildly fossiliferous (casts 375.3-376.1' - Fracture, 80 deg, rough, undulating, 9-9/16" length visible 375.5, 375.7, 376.1, 377.6, 378.3' - Fractures 3 and molds), 360.4' undulating bedding plane 1/4" thick, dark yellowish brown (10YR 4/2) R36-HQ 2 or mechanical break (5), horizontal, rough, 67 5 ft 100% undulating 361.3-362.4' - yellowish gray, (5Y 7/2), very fine to fine grained, 376.8' - Fracture or mechanical break, horizontal, smooth 1 moderate to strong delayed HCI reaction, contains silt-sized particles R36: 5 minutes between breaks 1 362.4-363.5' - grayish yellow, (5Y 379.0 8/4), fine to medium grained, strong HCl reaction, solution cavities 379.2-379.4' - Fracture zone, subangular >10 1/8"x1/2" fragments, 1" length or less 380 No Recovery 363.5-364.0' 379.9' - Fracture or mechanical break. -338.0 Limestone horizontal, smooth >10 364.0-364.6' - very pale orange to grayish orange, (10YR 8/2 to 10YR 380.1-380.6' - Fracture zone, subangular fragments, 1" length or less, no visible R37-HQ 7/4), fine to medium grained, delayed orientation between fractures 60 3 5 ft HCl reaction, very weak to weak (R1 to R2), 1/16" voids cover 10-20% of 380.1' - Fracture, horizontal, rough, 82% undulating SC-4 collected at 381.7surface, few cavities 1/4"x1/2" 380.6' - Fracture, 35 deg, rough 1 364.6-366.5' - dusky yellow, (5Y 6/4), 381.0' - Fracture, <5 deg, rough, undulating 381.2, 381.7' - Fractures (2), horizontal, very fine to fine grained, delayed mild R37: 5 minutes rough, undulating 382.7' - Fracture, 50 deg, rough, undulating to strong HCl reaction, very weak to NR weak (R1 to R2), laminar bedding 384.0 1/8" planes throughout the section



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 5.1	7 ft bg	gs on 9		7/200		. Borton, J. Burkard, J. Townes
£□≨	(%			DISCONTINUITIES	၅၉	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
385 -343.0 -	R38-HQ	Q 13	>10	384.0-385.0' - Fracture zone, rough, undulating, no visible orientation, angular fragments up to 1" length  385.3' - Fracture or mechanical break, horizontal, rough, undulating, 20% of fractured plane stained black		366.5-368.9' - yellowish gray, (5Y - 7/2), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), highly fossiliferous (molds - and casts), two casts at 368.4' (bivalve crinoids, 1"), solution cavities 1/4"x1"	- - - -
- - -	5 ft 74%		>10	385.8-387.7' - Fracture zone, no visible orientation, angular fragments up to 2" in length		No Recovery 368.9-369.0' Limestone 369.0-372.3' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to very fine grained, strong HCl	-
-	389.0		NR		Ħ	reaction, very weak to weak (R1 to R2), moderately fossiliferous (casts and molds), 369.0-370.2': 1/16" voids 20-40% of surface, 370.2-372.3':	R38: 6 minutes
390 -348.0 -	R39-HQ 5 ft 90%	48	>10	389.4' - Fracture zone, no visible orientation, subangular fragments up to 1/2" length 389.9' - Fracture or mechanical break,	H	<ul> <li>1/16" voids covering up to 0-10% of surface</li> <li>372.3-373.8' - yellowish gray, (5Y</li> </ul>	-
			1	horizontal, rough, undulating 390.5' - Fracture, horizontal, smooth, possible mechanical break		7/2), fine to medium grained,     moderate to strong HCl reaction,  very weak to weak (R1 to R2),     moderately fossiliferous (casts and	-
- - -			3	391.0, 391.1' - Fractures (2), horizontal, smooth, bedding plane parting 391.5, 391.8, 392.0, 392.3, 392.4' - Fractures (5), horizontal, smooth, undulating		moderately fossiliferous (casts and molds), solution cavities 1/2"x1" in size  No Recovery 373.8-374.0' Limestone	-
-			3 NR	393.1, 393.2' - Fractures (2), horizontal, smooth, undulating, bedding plane parting 393.3' - Fracture or mechanical break,		374.0-378.5' - transitions from grayish yellow to dusky yellow, (5Y 8/4 to 5Y 6/4), fine to medium grained, mild to moderate HCl	R39: 7 minutes
395_ -353.0			3	horizontal, rough, undulating 394.3, 394.4, 394.7' - Fractures (3), horizontal, smooth, bedding plane parting		grained, mild to moderate FICI reaction, very weak to weak (R1 to R2), voids to <1/16" over 10-20% of surface, moderately fossiliferous	0.2' of core believed to be recovered from R39 -
-555.0 - - -	R40-HQ 5 ft	43	>10 43 2	395.0, 395.2' - Fractures (2), horizontal, rough, undulating 395.4-395.7' - Fracture zone, no visible orientation, subangular fragments up to 1" 395.9' - Fracture, horizontal, rough		(casts and molds) 378.5-379.0' - bluish white, (5B 9/1), fine grained, delayed strong HCl reaction, weak (R2), voids to <1/16" over 30-50% of surface	- - -
- - -	100%		2	396.2' - Fracture, <5 deg, rough, undulating 396.6, 396.8, 397.8' - Fractures (3), horizontal, rough, undulating		<ul> <li>379.0-380.6' - yellowish gray, (5Y</li> <li>8/1), fine to medium grained, delayed moderate to strong HCl reaction,</li> <li>very weak to weak (R1 to R2), planar</li> </ul>	- - R40: 7 minutes
-40 <u>0</u> -358.0 - - - - -	399.0		3	398.4' - Fracture, horizontal to 10 deg, smooth, undulating 399.2, 399.4, 399.6' - Fractures (3), <10 deg,		laminations, trace fossils 380.6-383.1' - Same as 378.5-379.0' except yellowish gray, (5Y 7/2) No Recovery 383.1-384.0'	
	R41-HQ 5 ft 74%	37	3	rough, undulating 399.9' - Fracture, horizontal, smooth, undulating		Limestone  384.0-385.0' - yellowish gray, (5Y 7/2), fine to medium grained, moderate HCl reaction, weak (R2),	- -
			2	400.1, 400.2' - Fractures (2), horizontal, rough, undulating, bedding parting 400.6' - Fracture or mechanical break, horizontal, rough, undulating		voids to <1/16" over 20-30% of surface 385.0-386.0' - light bluish gray, (5B 7/1), fine grained, moderate to strong	-
			1	401.0' - Fracture or mechanical break, horizontal, smooth, undulating 401.8, 402.1' - Fractures (2), horizontal, smooth, undulating		HCI reaction, weak to medium strong (R2 to R3), trace organics	-
_	404.0		NR		Ħ	_	R41: 5 minutes



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.17 ft bgs on 9/13/07 START: 8/23/2007 END: 9/7/2007 LOGGER: R. Bitely, C. Sump, T. Borton, J. Burkard, J. Townes DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS 386.0-387.7' - yellowish gray, (5Y 0.3' of core placed in box 2 404.3' - Fracture, <5 deg, rough, undulating 7/2), fine to medium grained, delayed with R41 mild to moderate HCI reaction, weak 405 Mechanical break at 404.9, 405.7' - Fractures or mechanical break -363.0 bottom of 0.3' is horizontal (R2), layered organics, laminae (2), horizontal, smooth visible, voids to 1/16" over 20-30% of 1 and smooth 406.4' - Fracture, <10 deg, rough, undulating surface, possible cross bedding No Recovery 387.8-389.0' SC-5 collected at 404.75-R42-HQ 406.7' - Fracture, 20 deg, rough, undulating 60 2 Limestone 405 55' 5 ft 407.0' - Fracture, horizontal, smooth, 389.0-391.5' - very pale orange, 100% undulating (10YR 8/2), fine to medium grained, 407.2' - Fracture, horizontal, smooth 3 delayed mild to moderate HCI reaction, very weak (R1), voids to 407.7-407.9' - Fracture, horizontal, rough, <1/16" over 0-10% of surface R42: 10 minutes undulating, fine to very fine grained 391.5-393.5' - yellowish gray, (5Y 5 408.0' - Fracture, <5 deg, rough, undulating 8/1), fine to medium grained, delayed 408.3' - Fracture, 10 deg, rough, undulating 408.7' - Fracture, horizontal, rough, 409.0 mild to moderate HCI reaction, very weak (R1), trace surface voids >10 undulating (<1/16"), 393.1': chert lens 0.05" 410 408.9' - Fracture or mechanical break, <10 No Recovery 393.5-394.0' -368.0 deg, rough, undulating, bedding plane parting Limestone 409.0' - Fracture or mechanical break, <10 1 394.0-395.2' - pale greenish yellow, (10Y 8/2), fine grained, strong HCI deg, smooth, undulating 409.3' - Fracture zone, horizontal orientation R43-H0 of fragments up to 1-3/16" 409.6' - Fracture, horizontal, smooth, bedding reaction, very weak (R1), <1/16" >10 5 ft 72% 40 voids over 0-5% of surface 395.2-396.8' - Same as 394.0-395.2' plane parting 410.4' - Fracture or mechanical break, 1 except fine to medium grained, horizontal, rough, undulating 411.1-411.5' - Fracture zone, no visible moderate to strong HCI reaction, voids to <1/16" over 10-20% of R43: 10 minutes NR orientation, one fragment 2-3/8", most 396.8-399.8' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak <1-3/16", subangular, silty clay size, fine to 414.0 very fine fill to weak (R1 to R2), voids to <1/16" 411.9' - Fracture, horizontal, smooth, >10 over 20-30% of surface undulating 415 399.8-402.7' - Same as 395.2-396.8' -373.0 412.5' - Fracture or mechanical break, 5 deg, except yellowish gray, (5Y 8/1), fine rough, undulating 1 grained, delayed strong HCl reaction No Recovery 402.7-404.0' 414.3-414.6' - Fracture zone, no visible orientation, fragments up to 2-3/8", R44-HQ Limestone subangular, silt/clay intermixed with >10 5 ft 18 404.0-407.4' - yellowish gray, (5Y 88% limestone fragments 414.9-415.0' - Fracture zone, no visible orientation, fragments up to 5/8", subangular 8/1), fine to medium grained, delayed strong HCl reaction, very weak (R1), >10 voids up to <1/16" over 0-5% of 415.4' - Fracture, horizontal, rough, surface undulating, lithologic discontinuity R44: 8 minutes 407.4-409.4' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine 416.0, 416.05, 416.1, 416.2, 416.35' -NR Fractures (5), horizontal, rough, undulating, 419.0 to medium grained, mild to moderate bedding plane partings HCl reaction, weak (R2), trace voids 416.5' - Mechanical break >10 <1/6", fine scale laminar and planar 416.8-416.9' - Fracture zone, no visible Driller did not note a 420 bedding 409.4-410.45' - yellowish gray with change in drilling patterns orientation, fragments up to <5/8", -378.0 (no given reason for low subangular to angular >10 undulating laminae of olive gray, (5Y 8/1 and 5Y 4/1), fine to medium 417.4' - Fracture, <5 deg, rough, undulating, recovery) trace fill 417.8-418.1' - Fracture zone, no visible orientation, fragments up to 1-7/8", trace fine R45-HQ grained, mild HCl reaction, extremely 17 5 ft weak to very weak (R0 to R1), voids 42% to very fine grained fill 419.0-419.9' - Fracture zone, no visible to <1/16" over 0-5% of surface, delayed HCl reaction but strong NR reaction when pulverized, undulating orientation, fragments up to 2-3/8", subround, laminations fine to very fine fill R45: 10 minutes 419.9' - Fracture, 10-20 deg, smooth 424.0



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ORIENTATION: Vertical

#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing WATER LEVELS: 5.17 ft bgs on 9/13/07 START: 8/23/2007 END: 9/7/2007 LOGGER: R. Bitely, C. Sump, T. Borton, J. Burkard, J. Townes DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD <u>∪</u> MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS 420.2-420.6' - Fracture zone, <10 deg at 410.45-412.6' - yellowish gray, (5Y 424.4': Man-made break >10 420.2', no visible orientation elsewhere; 7/2), fine to medium grained, delayed fragments up to 2-3/8", mostly smaller varying sizes, trace dark brown-black staining 425 mild HCI reaction, very weak (R1), 383.0 trace voids <1/16 424.7-424.9' - Fracture zone, no visible >10 No Recovery 412.6-414.0' orientation, subangular fragments up to <5/8", fine to very fine grained fill Limestone 414.0-414.5' - Same as R46-HQ 425.3-425.5' - Fracture zone, no visible 410.45-412.6' 30 >10 5 ft 414.5-415.3' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), 88% orientation, fragments up to 1-3/16", angular, trace very fine fill 425.8-426.2' - Fracture zone, large fragments medium grained, mild to moderate up to 3", possible multiple mechanical breaks HCl reaction, very weak (R1), voids 426.4-427.0' - Fracture zone, fragments up to to <1/16" over 10-20% of surface R46: 12 minutes >10 Silty Clay (CL-ML) 415.3-415.9' - dark greenish gray 4", subangular to angular, multiple NR mechanical breaks during extraction 429.0 427.2' - Mechanical break transition to greenish gray, (5GY 4/1 429.5' and 429.8': Man-427.5' - Fracture, horizontal, smooth, bedding to 5GY 6/1), very fine to fine grained, 1 made breaks plane parting 427.8-428.4' - Fracture zone or mechanical 430 no HCl reaction, extremely weak -388.0 (R0) Only able to obtain 4.0' run break, fragments up to 3", trace dark >10 Limestone due to core blockage R47-HQ gray/blue staining 429.5' - Fracture, horizontal, smooth, undulating, bedding plane parting 415.9-418.4' - yellowish gray, (5Y 46 4 ft 8/1), fine to medium grained, very 100% >10 weak (R1), moderate to strong HCI 430.1-430.2' - Fracture zone, no visible reaction where pulverized orientation, fragments up to 1-3/16", trace No Recovery 418.4-419.0' R47: 12 minutes fine to very fine infill >10 Limestone 430.7' - Fracture, horizontal, smooth, 419.0-419.9' - yellowish gray, (5Y 433.0 undulating, bedding plane parting 430.85' - Fracture, 80 deg, rough, undulating 7/2), fine to medium grained, weak to 2 medium strong (R2 to R3), strong 431.0' - Fracture, horizontal, smooth, bedding HCI reaction when pulverized, clays plane parting are very fine to fine grained, 431.5' - Fracture, 45 deg, rough, undulating, extremely weak (R0), no HCI 2 fragments of quartz up to 1/2", angular to reaction, medium plasticity 435 subangular Limestone -393 0 SC-6 collected at 435.3-431.9-433.0' - Fracture zone, no visible 419.9-421.1' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine 1 436.2' orientation, fragments up to 2", angular, trace R48-HQ 56 fine to very fine fill 6 ft grained, slightly delayed strong HCl 100% 433.4, 433.6' - Fractures or mechanical break 3 reaction, weak to medium strong (R2 (2), horizontal, bedding plane parting, trace to R3), <1/16" voids on 10-20% of black staining surface 434.0' - Fracture, horizontal, smooth, No Recovery 421.1-424.0' >10 undulating Limestone 434.5' - Fracture or mechanical break, <10 424.0-424.7' - yellowish gray to light R48: 20 minutes deg, smooth olive gray, (5Y 7/2 to 5Y 5/2), fine to 2 435.1-435.5' - Fracture or mechanical break, medium grained, moderate HCI 439.0 45-50 deg, rough, stepped reaction, weak to medium strong (R2 436.3' - Fracture, horizontal, smooth, trace fill to R3), voids <1/16" on surface >10 436.5, 436.6' - Fractures (2), 20-30 deg, rough, undulating, large solid fragment 10-20% 440 -398.0 Clayey Gravel (limestone 1-3/16" in between Fragments) (GC) 437.1-437.6' - Fracture zone, no visible >10 424.7-425.55' - yellowish gray, (5Y orientation, fragments up to 2-3/8", angular to 8/1), moderate to mild HCl reaction, R49-HQ subangular, trace amounts of very fine fill extremely weak (R0), fine to medium 0 5 ft 437.6-438.1' - Fracture, 80 deg, rough, grained limestone gravels, <1/2" 46% undulating Limestone 438.1' - Fracture, horizontal, smooth, bedding 425.55-426.2' - yellowish gray, (5Y plane parting NR 8/1), fine grained, very weak (R1), .438.4' - Fracture or mechanical break, 40 strong HCl reaction where pulverized R49: 10 minutes deg, rough, undulating 444.0



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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.17 ft bgs on 9/13/07 START: 8/23/2007 END: 9/7/2007 LOGGER: R. Bitely, C. Sump, T. Borton, J. Burkard, J. Townes DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD <u>∪</u> RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS 439.0-439.6' - Fracture zone, no visible Clayey Gravel (limestone >10 orientation, weak fragments <1/2", angular to Fragments) (GC) 426.2-426.4' - Same as 424.7-425.55' except slightly delayed 445 subangular -403<u>.0</u> 439.6' - Bedding plane, horizontal 439.8' - Fracture, <5 deg, clay and gravels 2 strong HCl reaction, clay, low to <1/2" fill medium plasticity 440.0-441.3' - Fracture zone, no visible orientation, fragments up to 2", mostly <1", Manual break above 446.5' R50-HQ Limestone 53 2 426.4-428.4' - Same as to fit in box 5 ft subangular, possibly fine grained fill 94% 425.55-426.2' except very fine to fine 444.0-444.8' - Fracture zone, fragments up to grained, slightly delayed moderate to 1-3/16"', subround, including quartz 2 strong HCl reaction, medium strong fragments to strong (R3 to R4), laminations 444.8' - Fracture, horizontal No Recovery 428.4-429.0' R50: 14 minutes 1 445.6, 445.9' - Fractures or mechanical break I imestone (2), horizontal, rough, undulating 429.0-430.2' - alternating yellowish NR 449.0 446.6, 446.8' - Fractures or mechanical break, 10-20 deg, rough, undulating, gray and very light gray, (5Y 8/1 and 3 N8), fine grained, delayed mild HCl fractures same direction 450 reaction, very weak to weak (R1 to 447.5, 447.7' - Fractures, 10-20 deg, 408.0 R2), laminar planar bedding with fractures angled in opposite directions: 447.5' >10 some variation angled toward ground surface, 447.7' angled 430.2-430.7' - yellowish gray, (5Y 8/1), very fine to fine grained, away from horizontal R51-H0 448.3' - Fracture, horizontal, smooth, delayed mild HCl reaction, medium 13 5 ft undulating strong to strong (R3 to R4), trace 44% 449.3' - Fracture, horizontal, smooth, voids <1/16" undulating, bedding plane parting Clay (CL) 449.7' - Fracture, 30-40 deg, rough, 430.7-431.0' - dark greenish gray, undulating 449.7-450.0' - Fracture or mechanical break, (5G 4/1), very fine grained, low to R51: 14 minutes medium plasticity, no HCl reaction, extremely weak (R0) >80 deg, rough, undulating 454.0 450.0-450.9' - Fracture zone, fragments up to Limestone 2-3/8", angular to subangular, trace black >10 431.0-431.5' - yellowish gray, (5Y staining 455 7/2), fine to medium grained, 454.0-454.3' - Fracture zone, no visible -413.0 extremely weak (R0) orientation, fragments up to 1-3/4", 2 431.5-431.9' - Sàmé as 429.0-430.2' subangular except yellowish gray, (5Y 7/2), weak 454.3-454.9' - Fracture, rough, gradually to medium strong (R2 to R3), R52-HQ undulating 454.6, 454.8' - Fractures or mechanical break >10 0 laminations 5 ft 86% Clayey Gravel (limestone (2), horizontal to <10 deg Fragments) (GC) 454.9' - Fracture, 45 deg, rough, undulating 431.9-433.0' - yellowish gray, (5Y 455.2, 455.3' - Fractures or mechanical break >10 7/2), moderate HCl reaction, weak to (2), horizontal to <10 deg, rough, undulating, medium strong (R2 to R3), very fine R52: 17 minutes large angular gravels, 1-3/4" to fine grained gravel, low to medium 455.7-456.9' - Fracture zone, no visible NR 459.0 plasticity clay orientation, fragments up to 4", mostly <1-3/16", including quartz - no HCl reaction Limestone >10 433.0-436.2' - light olive gray, (5Y 457.0' - Fracture, 20-30 deg, rough, R53-HQ 460 undulating 457.3-457.5' - Fracture zone, fragments 5/2), fine to medium grained, weak to 0 2 ft -418.0 R53: 8 minutes medium strong (R2 to R3), strong 95% 1 <1-3/16", including quartz HCI reaction when pulverized, 457.9-458.3' - Fracture zone, angular fragments up to 2-3/8", horizontal bedding 461.0 undulating lamination NR 436.2-437.5' - yellowish gray, (5Y 7/2), fine to medium grained, 2 plane at 457.9' 459.1-460.4' - Fracture zone, no visible 461.65': circular void with moderate to strong HCl reaction, drusy crystals weak to medium strong (R2 to R3), orientation, fragments up to 2-3/8", R54-HQ 39 >10 voids <1/16" over 20% of surface 3 ft subangular, including quartz 100% 460.7' - Fracture, <10 deg, rough, undulating, R54: 10 minutes fragments of quartz infill 2 461.1' - Fracture or mechanical break, 464.0 horizontal, rough, undulating



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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.17 ft bgs on 9/13/07 START: 8/23/2007 END: 9/7/2007 LOGGER: R. Bitely, C. Sump, T. Borton, J. Burkard, J. Townes DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS 461.9' - Mechanical break, horizontal, rough, 437.5-438.0' - dark greenish gray >10 undulating with dusky yellow, yellowish gray, very light gray, (N8 with 5Y 6/4, 5GY 8/1, 5Y 4/1), very fine to fine grained, 465 462.2' - Fracture, horizontal, smooth, bedding plane parting 462.7-463.15' - Fracture zone: at 462.7', -423<u>.0</u> very strong delayed HCl reaction, strong (R4), trace chert layers 438.0-439.0' - yellowish gray, (5Y 7/2), moderate to strong delayed HCl 1 20-30 deg; at 463.15', 20-30 deg (opposite directions), elsewhere no visible orientation. R55: 15 minutes R55-HQ fragments up to 1-3/4", angular to subangular 17 >10 5 ft 463.4' - Fracture, horizontal, rough, reaction, strong (R4), <1/16" voids 82% over <5% of surface, trace organics undulating, bedding plane parting Milky white quartz found on (peat or coal) >10 463.7' - Fracture, horizontal, rough, table after core was boxed; undulating Coal possibly from fracture 464.3-465.0' - Fracture zone, no visible 439.0-439.5' - black, (N1), very fine to fine grained, extremely weak (R0), zone, not found orientation, angular fragments up to 1-13/16" somewhere in run (after NR 465.3' - Fracture, horizontal, rough, boxed) 469.0 trace amounts of limestone fragments: dusky yellow (5Y 6/4), 465.7-466.8' - Fracture zone, (465.7-466.1': >10 fine to medium grained, mild HCl fine to medium infill with limestone reaction, trace calcite crystals to 1/8" 470 fragments); fragments up to 1-3/4", black 428.0 Limestone Fragments staining, mostly infill at 466.6-466.8' 467.4-467.9' - Fracture zone, rough, undulating, horizontal at 467.4', no visible 4 439.5-441.3' - moderate olive brown. (5Y 4/4), fine to medium grained, extremely weak (R0), fine grains SC-7 collected at 470.85 to R56-H0 orientation elsewhere, fragments up to 0 have strong HCI reaction, gravels 42 5 ft 90% 472 05 2-1/16", angular to subangular, similar infill to have moderate HCl reaction, 20-30% 465.7-466.8', fine to medium grained, <10% voids on gravel, some weak (R1) black staining gravel >10 469.0-470.0' - Fracture zone, rough, No Recovery 441.3-444.0' undulating, fragments to 2-3/8", horizontal Limestone R56: 10 minutes plane at 470.0'; possible bedding plane 444.0-447.4' - yellowish gray, (5Y NR parting 7/2), fine to medium grained, very 474.0 . 470.6, 470.7, 470.75, 470.85' - Fractures (4), weak to weak (R1 to R2), strong HCl horizontal, rough, undulating 1 reaction where pulverized, voids to 472.0, 472.3' - Fractures or mechanical break 475 <1/16" over <5% of surface (2), 20 deg, rough, undulating, opposite -433.0 Limestone directions 3 447.4-448.7' - grayish orange, (10YR 472.6' - Fracture, horizontal, rough, 7/4), fine grained, medium strong undulating (R3), strong HCl reaction where R57-HQ 472.6-473.3' - Fracture zone, no visible 3 5 ft 65 pulverized orientation, fragments up to 4", mostly 100% No Recovery 448.7-449.0' <2-3/8" Limestone 474.3-474.5' - Fracture, horizontal to <10 449.0-450.0' - yellowish gray with 1 deg, open with fragment 2-3/8" light gray laminations, (5Y 8/1 and 475.0' - Fracture or mechanical break, N7), fine to medium grained, mild to R57: 13 minutes horizontal to <10 deg, rough, undulating 475.3' - Fracture, 20-30 deg, rough, with moderate HCl reaction, alternating very weak (R1) and weak (R2) 3 479.0 fragment 1-3/16", subangular 475.9' - Fracture or mechanical break, Limestone Fragments 450.0-451.2' - transition from >10 horizontal, rough, undulating, bedding plane yellowish gray to moderate yellowish brown, (5Y 7/2 to 10YR 5/4), fine to medium grained, moderate to strong 480 -438.0 476.3, 476.4' - Fractures (2), horizontal to >10 <10 deg, rough, undulating 476.5' - Fracture, 40-50 deg, rough, HCl reaction, medium strong (R3) in yellowish gray fragments, strong (R4) R58-HQ undulating, with large fragments 22 >10 in moderate yellowish brown gravels 5 ft 477.4' - Fracture or mechanical break, 10-20 96% No Recovery 451.2-454.0' deg, rough, undulating 478.2, 478.5' - Fractures or mechanical break 1 (2), <10 deg, rough, undulating, black staining 478.8' - Mechanical break, horizontal, rough, R58: 10 minutes 2 undulating 484.0



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 5.1	7 ft b	gs on 9	9/13/07 START: 8/23/2007 END: 9/	/7/200	)7	LOGGER: R. Bitely, C. Sump,	Т.	Borton, J. Burkard, J. Townes
>00	(9)			DISCONTINUITIES	G		LITHOLOGY		COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES r	DESCRIPTION	SYMBOLIC LOG		ROCK TYPE, COLOR,		SIZE AND DEPTH OF CASING,
A BE	JE T. Y. H. N. Y. Y. H. N. Y. Y. Y. Y. Y. Y. Y. Y. Y. Y. Y. Y. Y.	(%) O	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	<b>7</b>		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,		FLUID LOSS, CORING RATE AND
H.F.	ORE ENG	Ø	SAC ER F	PLANARITY, INFILLING MATERIAL AND	√MB		AND ROCK MASS		SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	0 H E	œ		THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	Ļ	CHARACTERISTICS		
_			\ <u>NR</u> / >10	478.9' - Fracture or mechanical break, 40-50 deg, rough, undulating	世	L	Limestone 454.0-456.8' - yellowish gray to		_
485_			. 10	479.4-479.7' - Fracture zone, horizontal at	$oldsymbol{\perp}$	L	dusky yellow, (5Y 7/2 to 5Y 6/4), fine		
-443.0			2	479.7', no visible orientation elsewhere, fragments up to 1-3/4"	」	1	to medium grained, strong HCI reaction, medium strong to strong		
	R59-HQ 4 ft	0		479.7-480.0 - Fracture or mechanical break,	上	L	(R3 to R4), <1/16" voids on 0-10% of		
	88%	U	>10	80-90 deg, rough, undulating 480.0' - Fracture, 30-40 deg, rough,		Ŧ	surface 456.8-457.3' - moderate yellowish		
			/10	undulating	T	Γ	brown, (10YR 5/4), medium grained,		
			3	480.0-480.4' - Fracture zone, fragments up to	╨	ſ	moderate HCl reaction, very weak		R59: 13 minutes
_	488.0		NR	1-3/4", angular 480.4' - Fracture, horizontal, rough,	H	Ŧ	(R1), trace organics Limestone Fragments		_
_	100.0			undulating, bedding plane parting	世	t	457.3-458.3' - Same as 454.0-456.8'		-
_			3	480.9-481.3' - Fracture zone, no visible orientation, fragments up to 1-3/4", angular to	╁	ł	except more fragmented No Recovery 458.3-459.0'		-
-				subangular	F	1	Limestone		-
490			>10	481.7' - Fracture, 30 deg, slightly rough, slightly undulating	世	t	459.0-460.0' - white to very light gray,		-
-448.0				481.9-482.2' - Fracture zone, no visible	╫	H	(N9 to N8), fine to medium grained, mild to moderate HCl reaction,		<del></del>
_	R60-HQ		>10	orientation, fragments up to 1-3/16" 482.9' - Fracture, horizontal to <10 deg,	ፗ	╊	medium strong to strong (R3 to R4),		-
-	6 ft	38		rough, undulating	士	╊	voids to <1/16" over 10-20% surface area, laminations		SC-8 collected at 490.35-
_	70%		>10	483.3' - Fracture, <5 deg, rough, undulating 483.6-483.7' - Fracture, horizontal, rough,	+	╁	460.0-460.4' - Same as 456.8-457.3'		491.25' -
_			>10	large fragment in between 1-3/16"	干	₽	except yellowish gray, (5Y 7/2), fine to medium grained		-
-			· 10	484.0-484.1' - Fracture zone, no visible orientation, fragments up to 1-5/8", mostly	Ľ	╁	460.4-460.9' - Same as 459.4-460.0'		-
_			NR	<5/8", subangular	╨	╁	except moderate HCl reaction No Recovery 460.9-461.0'		R60: 20 minutes
_			111	484.3, 484.5 - Fractures (2), horizontal,	$\blacksquare$	1	Limestone		Roo. 20 Millutes
_	494.0			slightly rough, slightly undulating, bedding plane partings	上	1	461.0-462.2' - Same as 459.0-460.0'		_
_			3	484.7, 484.8 - Fractures or mechanical break	╁╌	╁	except fine grained, strong HCI reaction		_
495				(2), horizontal, rough, undulating 484.9-485.2' - Fracture zone, fragments up to −	F	L	462.2-463.0' - Same as 460.0-460.4'		
-453 <u>.0</u> _			>10	2-3/8", rough, angular; horizontal fractures at	Ħ	1	except yellowish gray with olive gray laminations, (5Y 7/2 with 5Y 3/2)		_
_				484.9' and 485.2': rough, undulating 485.4, 485.5' - Fractures or mechanical break	世	L	463.0-464.0' - Same as 461.0-462.2'		_
_			1	(2), <10 deg, rough, undulating, possible	$\vdash$	Ł	except very light gray with light bluish gray, (N8 with 5B 7/1), fine to		_
	R61-HQ 6 ft	22		bedding partings 485.8-486.3' - Fracture zone, fragments up to	上	1	medium grained, strong to very		
	62%	22	>10	3", mostly <5/8", subangular to angular	一	Ł	strong HCl reaction, <10% voids on surface		
				486.6' - Fracture or mechanical break, horizontal, rough, undulating	厅	Ĺ	Limestone		
				486.8, 487.0, 487.2' - Fractures or	片	1	464.0-465.7' - pale greenish yellow, (10Y 8/2), fine to medium grained,		
			NR	mechanical break (3), horizontal, rough, undulating	世	ſ	strong HCl reaction, very weak to		]
				487.2-487.5' - Mechanical break, >80 deg,	$\vdash$	ſ	weak (R1 to R2), long voids to 1-1/2", mostly <1/16", over 20-30% of		R61: 18 minutes
500	500.0			rough, undulating  488.0-488.3' - Fracture, 70 deg, rough,	T	T	surface, possible dissolution features		1
-458.0				undulating		П	Silty Limestone Fragments (GM) 465.7-466.8' - dusky yellow, (5Y 6/4),	П	-
				488.3' - Fracture or mechanical break,	1		medium grained, moderate to strong		_
_				horizontal, rough, undulating 488.9' - Fracture or mechanical break,	1		HCl reaction, extremely weak (R0)	Ш	-
-				horizontal, rough, undulating, bedding plane	1		Limestone 466.8-467.4' - yellowish gray, (5Y		=
_				parting 489.3' - Fracture, horizontal, rough,	1		7/2), fine to medium grained,	$\ $	-
-				undulating, open with large rock fragment	1	$\vdash$	moderate to strong HCl reaction, weak (R2), <10% voids to <1/16" on		-
-				1-3/4", angular 489.8-490.3' - Fracture zone, horizontal	1	$  \cdot  $	surface, undulating laminations		-
-				fragments, two large <4", mostly <1-3/16",	1	$  \cdot  $	transition to planar, trace organics	Ш	-
				trace silty infill	+	H		Н	_
						_			



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical

				1511 : Dietrich D-120 3/N 620, BE3001 3/N 1317, Illia				ORIENTATION: Vertical
WATER	LEVELS : 5.	17 ft bo	gs on s		7/20	<u>07</u>	LOGGER: R. Bitely, C. Sump, 7	
≥□£	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	چ ا	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	7 A ∑		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ı	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ᆱ끯읃	P. F. F.	(%) О	UR COC	DEDTH TYPE OPIENTATION POLICHNESS	<b>7</b>	ı	MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
F & S	#P20		ACT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	₩ W	ı	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SCF	REGO	a a	FR/	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	ı	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
<del></del>		_		491.2-492.2' - Fracture zone, or multiple	+-	+	Limestone With Peat	
-				mechanical breaks, fragments up to	4	F	467.4-468.1' - grayish black and	-
				2-1/2"-5", mostly <2-3/8", angular with		L	dusky yellow, (N2 and 5Y 6/4),	
				variable orientation		F	medium grained, dusky yellow has	
-				494.2' - Fracture, horizontal, smooth,	1	ŀ	moderate to strong HCl reaction,	-
-				undulating 494.6' - Fracture or mechanical break, 20-30	-	ŀ	extremely weak to very weak (R0 to R1), prevalent organics	_
				deg, rough, undulating	1	L	No Recovery 468.1-469.0'	_
				494.7-495.7' - Fracture zone, horizontal at		ı	Limestone Fragments	
				494.7', elsewhere no visible orientation,	1	Γ	469.0-469.5' - yellowish gray, (5Y	
-				fragments up to 3", angular	1	ŀ	7/2), with milky white quartz	-
_				496.2' - Fracture, horizontal, rough, undulating, possible bedding plane parting	4	F	fragments, fine with medium coarse gravels, weak to medium strong (R2	_
				497.1' - Fracture or mechanical break,	_	L	to R3) gravels, extremely weak (R0)	
				horizontal, rough, undulating		1	fines, fragments up to 4", limestone	
]				497.4-497.7' - Fracture zone, subangular	1	t	gravels mild HCl reaction, quartz no	1
-				fragments up to 1-3/4"	1	ŀ	HCI reaction	-
_				_	4	F	Limestone 469.5-473.5' - transition from yellow	_
					_	L	gray to light olive gray, (5Y 7/2 to 5Y	
						Г	5/2), fine to medium grained,	
-					1	t	moderate to strong HCl reaction,	1
-					-	ŀ	medium strong to strong (R3 to R4),	=
_					4	L	variable voids, mostly <30% up to 1/4" diameter, 470.4-<470.85": calcite	_
						L	crystals in voids up to 1-1/2", mostly	
					1	Г	<1/4" for 50-60% voids, at 470.8'	
1 7					1	t	linear features - possible burrows or	
-					1	ŀ	dissolution features 1-1/2" to 2" long, 1/4" wide	-
-					-	ŀ	No Recovery 473.5-474.0'	-
					1	L	Limestone	_
						ı	474.0-479.0' - from light olive gray to	
				_	1	Γ	yellowish gray with depth, (5Y 5/2 to 5Y 7/2), fine to medium grained	
-					1	ŀ	fining with depth, moderate to strong	-
-					-	ŀ	HCI reaction increasing with depth,	=
_					4	L	weak (R2), at 478.2' <1-3/16" zone of	_
					⅃	L	extremely weak to very weak (R0 to R1) with strong HCl reaction, voids	
]					1	Γ	<1/16" on 10-20% of surface	1
-					1	t	479.0-483.8' - yellowish gray, (5Y	1
-					1	F	7/2), fine to medium grained,	-
-					-	F	moderate to strong HCl reaction, weak (R2), voids to <1/16" on 25% of	-
					1	L	surface, fossiliferous (casts and	
					1		molds), 479.5-480.3': coarse pebble	
]					1	T	size fragments, very pale orange	1
-				<del>-</del>	1	H	(10YR 8/2), hardness and reactivity same as surrounding lithology,	
-					-	F	481.6-481.9': silty gravels, same as	-
-					1	L	surrounding lithology, 482.4-483.1':	_
					]	L	quartz in voids, crystalline growth	
]						ſ	No Recovery 483.8-484.0'	1
-					1	t		1
-					1	F		-
-					-	F		-
					1	L		
						T	-	



PROJECT NUMBER:	BORING NUMBER:					
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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724033.5 N, 457716.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT: Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical

WATER	WATER LEVELS : 5.17 ft bgs on 9/13/07						LOGGER: R. Bitely, C. Sump,	Г. Borton, J. Burkard, J. Townes
300	(0			DISCONTINUITIES		O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	OLZE AND DEDTH OF GARING
ᆱᇷ	RUN H, 4 ÆR	(%)	URI DO	DEDTH TYPE OPIENTATION POLICE	INIESS	)LIC	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
PTF/ EVA	NG1 CO	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGH PLANARITY, INFILLING MATERIAL A	AND	MB	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
吕S급	SHR	R(	FR	THICKNESS, SURFACE STAINING, AND T	IGHTNESS	SΥ	CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
							Limestone	
					-		- 484.0-487.5' - yellowish gray, (5Y 7/2), fine to medium grained, weak	1
_							(R2), moderate to strong HCl	
-					-		reaction where pulverized, voids to	-
-					-		<1/16" on 20-30% of surface, at 485.1': silty clay zone, <2-3/8" wide,	-
_					_		extremely weak (R0), strong HCI	-
_					_		reaction, all other properties same as surrounding lithology, very similar to	-
_					_		474.0-479.0' and 479.0-483.5'	_
							No Recovery 487.5-488.0'	_
							Limestone 488.0-492.2' - yellowish gray, (5Y	
							7/2), fine to medium grained, strong	
					_		HCl reaction (slightly weaker with	1
-					_		depth), weak (R2), voids to <1/16" cover 15-25% surface, voids to 1/2"	1
-							with crystals that strongly react to	
-					-		HCI, very similar to 474.0-479.0' and 484.0-487.5'	·
-					=		No Recovery 492.2-494.0'	-
-					=		Limestone	-
_					=		494.0-497.7' - yellowish gray, (5Y 7/2), fine to medium grained	-
_					_		decreasing with depth (fining down),	_
I _					_		moderate to strong HCl reaction increasing with depth, very weak	_
							(R1) to weak (R2) slightly increasing	1
							with depth, <1/16" voids on 0-10%	
					_		surface No Recovery 497.7-500.0'	1
-					_		Bottom of Boring at 500.0 ft bgs on	-
_							9/7/2007	_
_					_		_	-
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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

WATER	LEVELS: 3.0	ft bgs	on 9/	08/07 START: 9/8/2007 END: 9	/12/20	007	LOGGER: J. Burkard, R. Bitely,	. Borton, J. Townes
≥∩≘	_			DISCONTINUITIES	၂ ပွ	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-157.7	200.0		>10	200.1, 200.3, 200.7, 201.7' - Mechanical break (4), 0-30 deg, rough, undulating	H	+	Limestone 200.0-201.9' - yellowish gray, (5Y	Boring AD-2 blind drilled to approximately 200 feet
-	R1-HQ		>10	200.9-201.6' - Fracture zone, angular fragments up to 2" in diameter	Ħ	+	7/2), fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), sand to gravel-sized broken	below ground surface before beginning sampling/logging.
-	4 ft 63%	0	>10	202.1-202.5' - Mechanical break		1	fragments, infill in section, trace voids (<1/16") over surface 201.9-202.5' - yellowish gray, (5Y	Start Drilling at 08:45 09/08/07, Water level 3.0' below ground surface
-	-		NR			+	7/2), fine to medium grained, moderate to strong HCI reaction, very weak (R1)	Logger is J. Burkard R1: 7 minutes
205	204.0		>10	204.0-204.7' - Fracture zone, broken fragments	H	+	No Recovery 202.5-204.0' Limestone 204.0-204.7' - very pale orange, (10Y 8/2), fine to medium grained,	-
-162.7 -			3	204.9, 205.4, 205.7, 206.0, 206.8, 207.2, 207.6' - Mechanical break (7), 0-20 deg, rough, undulating			moderate to strong HCI reaction, very weak (R1), voids <1/16" over 15-30% of surface	-
_	R2-HQ 5 ft 80%	15	>10				204.7-205.6' - yellowish gray, (5Y 7/2), fine to medium grained, mild to moderate HCl reaction, very weak to	-
_			>10	207.2-207.8' - Fracture, vertical, rough, undulating, split core in two halves 207.5' - Mechanical break	#	$\frac{1}{4}$	weak (R1 to R2), trace voids less than 1/16" of surface Silty Sand (SM)	-
-	209.0		NR	207.8-208.0' - Mechanical break		1	205.6-206.4' - silty sand sized particles with broken limestone fragments up to 1/2" in diameter	R2: 9 minutes
210 -167.7			>10	209.3-210.3' - Fracture zone, angular fragments up to 2" in diameter		Ł	Limestone 206.4-207.8' - pale greenish yellow, (10Y 8/2), very fine to fine grained,	- 
-107.7	Pa uo		>10	210.4-210.8' - Mechanical break	#	1	moderate to strong HCI reaction, weak to medium strong (R2 to R3), laminar bedding plannes <1/16"	-
-	R3-HQ 5 ft 36%	7	NR				207.8-208.0' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak to extremely weak (R1 to R0) No Recovery 208.0-209.0' Limestone 209.0-209.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 10-20% of	R3: 11 minutes
215_			8	214.0-214.4' - Fracture zone, rough, undulating, broken fragments up to 2" in diameter		1	surface 209.7-210.3' - pale greenish yellow, (10Y 8/2), very fine to fine grained,	_
-172 <u>.7</u> -			5	214.6, 214.7, 214.9, 215.2, 216.6, 216.8, 217.0, 217.4, 217.7, 218.8' - Mechanical break (10), 0-30 deg, rough to smooth,	Ħ	+	strong HCl reaction, very weak (R1), <1/16" horizontal bedding planes 210.3-210.8' - very pale orange, (10Y 8/2), fine grained, strong HCl	-
-	R4-HQ 5 ft 100%	40	>10	undulating, minor black organic staining 215.7-216.4' - Fracture zone, rough, undulating, rock fragments up to 3" in diameter		1	No Recovery 210.8-214.0' Limestone	
-			3	217.5-217.7' - Mechanical break		1	214.0-219.0' - yellowish gray to pale greenish yellow, (5Y 7/2 to 10Y 8/2), fine to medium grained, moderate to	SC-1 collected at 217.8-
-	219.0		1		#	+	strong HCl reaction, very weak to weak (R1 to R2), fossil casts and molds, voids (<1/16") throughout	218.9' R4: 9 minutes
220			4		1	ŧ	from 214.0-214.4' and 215.0-216.5'	-



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING	METHOD A	ND E	QUIPN	MENT : BL300T S/N 1517, mud rotary, HQ tools, HW casi	ing		ORIENTATION : Vertical
WATER	LEVELS : 3.0	) ft bg	s on 9	/08/07 START: 9/8/2007 END: 9/	12/20	D7 LOGGER : J. Burkard, R. Bitely,	T. Borton, J. Townes
≥0≎	- %			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-177.7 - - - -	R5-HQ 5 ft 82%	22	4 >10 4	219.3, 219.4, 219.9, 220.0, 200.2, 200.4, 200.5, 200.9, 221.3, 222.5, 222.8, 223.0' - Mechanical break (12), 0-15 deg, rough, undulating 219.9, 223.0' - Fractures, 60-90 deg, rough, undulating 221.5-221.8' - Fracture zone, fragments up to 1/2" in diameter		Silty Limestone Fragments  219.0-219.3' - yellowish gray, (5Y 7/2), mild HCl reaction, with broken limestone fragments up to 1/8" in diameter Limestone  219.3-220.0' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, weak to medium strong	- - - -
-	224.0		NR >10	224.1, 225.1, 225.5, 226.1, 226.7, 227.1, 227.6, 228.3' - Mechanical break (8), rough to		(R2 to R3), laminar bedding planes  220.0-223.1' - pale greenish yellow, (10Y 8/2), moderate to strong HCI reaction, weak (R2), fossil molds and casts, surface cavities (trace	R5: 9 minutes
225_ -182.7 -	DC 110		3	smooth, undulating		amounts) up to 1/4" wide and 1/4" in height, pitting on surface No Recovery 223.1-224.0' Limestone 224.0-228.9' - pale greenish yellow,	 - -
- - -	R6-HQ 5 ft 98%	43	1 >10 >10	227.7-228.0' - Fracture zone, smooth to rough, along bedding planes, horizontal along bedding planes to 40 deg		(10Y 8/2), very fine to fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), wavy bedding plane up to 1/16" in thickness throughout section - some black organic material, surface pitting is present throughout the section	- - - R6: 9 minutes
- 230 -187.7 - -	229.0 R7-HQ 5 ft 80%	60	1 1	228.6' - Bedding plane, horizontal, smooth  230.0-230.3' - Fracture zone, rough, angular rock fragments 230.5, 231.8, 232.6, 232.8' - Mechanical break, 0-30 deg, rough, undulating 231.5' - Mechanical break		No Recovery 228.9-229.0' Limestone 229.0-233.0' - yellowish gray, (5Y 7/2), fine to medium grained, moderate HCl reaction, very weak to weak (R1 to R2), surface pitting throughout sample, 1/16" voids on surface throughout section, fossil casts	SC-2 collected at 230.5- 231.55' -
-	234.0		2 NR	232.5' - Mechanical break		- No Recovery 233.0-234.0' -	R7: 12 minutes
235 -192.7 - - -	R8-HQ 5 ft	0	>10 >10 >10	· · · · · · · · · · · · · · · · · · ·		Limestone  234.0-236.7' - yellowish gray, (5Y 7/2), fine to medium grained, moderate HCI reaction, extremely weak to very weak (R0 to R1), surface pitting throughout entire section	- - - -
- - - -	96%		>10 >10 NR 1			Silt (ML) 236.7-237.1' - yellowish gray, (5Y 7/2), mild HCl reaction, mottling present	R8: 8 minutes
240			'		H		



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

WATER	LEVELS: 3.0	ft bgs	s on 9/	08/07 START: 9/8/2007 END: 9/	12/20		T. Borton, J. Townes
≩Q⊋	<u> </u>			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	SÄÄ	R O	FR	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-197.7 - -	R9-HQ		2	239.5, 240.1, 241.6, 241.8, 242.3, 242.7, 243.0, 243.3' - Mechanical break, 0-10 deg, rough, undulating 241.1-241.3' - Fracture zone		Limestone  237.1-238.8' - yellowish gray, (5Y 7/2), fine to medium grained, moderate HCl reaction, extremely	-
-	5 ft 88%	53	>10			<ul> <li>weak to very weak (R0 to R1), with</li> <li>1/4" sections of very fine grain</li> <li>limestone</li> <li>No Recovery 238.8-239.0'</li> </ul>	- - -
-	244.0		1 NR			Limestone  239.0-243.4' - pale greenish yellow,  (10Y 8/2), fine to medium grained, moderate to strong HCl reaction,	R9: 7 minutes
245 -202.7			>10	244.0-244.7' - Fracture zone		very weak (R1), surface pitting throughout section, trace voids (1/16") throughout section No Recovery 243.6-244.0'	-
-	R10-HQ 5 ft	22	4	246.9, 247.3, 247.5, 247.8, 247.9' - Mechanical break (11), 0-10 deg, rough, undulating		Limestone 244.0-249.0' - pale greenish yellow, (10Y 8/2), fine to medium grained, moderate to strong HCl reaction,	-
-	100%		4			very weak (R1), surface pitting throughout section, very brittle rock	-
-	249.0		>10	248.1-248.5, 248.7-250.0' - Fracture zone (2), rough, undulating		- 249.0-254.0' - yellowish gray to pale	R10: 6 minutes
250 -207.7			3	249.4, 249.6, 250.1, 250.5, 251.6, 252.7' - Mechanical break (6), 0-30 deg, rough, undulating		<ul> <li>greenish yellow, (5Y 7/2 to 10Y 8/2),</li> <li>medium grained, moderate to strong</li> <li>HCl reaction, very weak to weak (R1</li> <li>to R2), with fine grained interbeds at</li> </ul>	- - -
-	R11-HQ 5 ft 100%	23	4	250.8-251.1' - Bedding plane, horizontal, smooth, undulating		250.7-251.1' and at 253.0 to 254.0', wavy bedding planes throughout section	-
-			6	252.3-252.4, 253.1-253.2' - Fracture zone (2), rough, undulating 253.0' - Bedding plane, horizontal, smooth		- -	- - R11: 9 minutes
-	254.0		3	254.2, 254.3, 255.1, 255.2, 255.8, 256.3,	Ħ	- 254.0-259.0' - yellowish gray, (5Y	-
255_ -212.7 -			3	256.9, 257.2, 257.4, 257.7, 258.3, 258.8' - Mechanical break (12), smooth to rough, undulating to stepped		<ul> <li>7/2), fine to medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), wavy</li> <li>bedding planes 1/16" thick</li> </ul>	_
-	R12-HQ 5 ft	73	2			throughout the section, densely concentrated section of fossil casts and molds from 255.4-255.5'	-
-	100%		3	-		_	-
-	259.0	7 258.4-258.5' - Fracture zone, angular rock fragments	- - -	R12: 9 minutes			
260			2			_	-



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

WATER	LEVELS: 3.0	ft bgs	s on 9/	08/07 START: 9/8/2007 END:	9/12/20	D7 LOGGER : J. Burkard, R. Bitely,	T. Borton, J. Townes
>∩≎	. (%			DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-217.7 - - -	R13-HQ 5 ft 96%	50	2	259.1, 259.5, 260.1, 260.7, 261.3, 261.4, 261.8, 263.2, 263.6' - Mechanical break (9), 0-10 deg, rough, undulating		259.0-263.8' - pale greenish yellow, (10Y 8/2), fine to medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), surface cavity at 259.7 up to 3/4" wide and up to 1/4" in height, wavy	
- - -	264.0		>10	262.1-262.2' - Fracture zone, angular rock fragments up to 1/2" 262.5-263.1' - Fracture zone, rough, undulating, 10 angular rock fragments up to 2" in diameter		bedding planes less than 1/16" in thickness throughout intact sections, voids to 1/16" over 5-10% of surface	R13: 8 minutes
- 265 -222.7 - -	R14-HQ 5 ft	40	>10 5	264.3-265.0' - Fracture zone, rough, undulating, up to 1" in length angular rock fragments  265.5, 265.7, 266.0, 266.1, 266.3, 266.6, 267.4, 267.7, 268.4' - Mechanical break (9), 0-20 deg, rough, undulating		<ul> <li>No Recovery 263.8-264.0¹</li> <li>Limestone</li> <li>264.0-266.9¹ - pale greenish yellow,</li> <li>(10Y 8/2), fine to medium grained, moderate to strong HCl reaction,</li> <li>very weak (R1), wavy bedding plane</li> <li>from 265.0-265.5¹ &lt;1/16" in thickness, 1/16" voids over 0-5% of surface</li> </ul>	- - -
- - -	94%		5 1 NR	267.0-267.2' - Fracture zone, rough, undulating, up to 1" in length angular rock fragments		266.9-267.5' - pale greenish yellow, (10Y 8/2), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), wavy bedding planes 1/16" in thickness 267.6-268.7' - pale greenish yellow,	R14: 8 minutes
- 270_ -227.7	269.0		>10	269.0-271.0' - Fracture zone 269.8-269.9' - Fracture zone		(10Y 8/2), fine to medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2)  No Recovery 268.7-269.0' Limestone 269.0-271.9' - light olive gray, (5Y 5/2), fine to medium grained,	
- - -	R15-HQ 5 ft 82%	33	4	271.3, 272.3, 272.7, 273.0' - Mechanical break (4), 0-30 deg, rough, undulating to stepped		moderate HCl reaction, very weak to weak (R1 to R2), with angular gravel-sized rock fragments 271.9-272.3' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, very weak to weak (R1	SC-3 collected at 270.95- 272.35'
_	274.0		NR >10	274.3' - Fracture, horizontal, rough,		to R2), trace voids 272.3-273.1' - yellowish gray, (5Y 8/1), moderate to strong HCI reaction, very weak to weak (R1 to	End drilling for the day at 16:43, 09/08/07 Continue drilling 09/09/07,
275 -232.7 - - - -	R16-HQ 5 ft 46%	13	>10 >10 >10 >10	undulating, tight 274.45' - Fracture, 85 deg, rough, undulating, tight 274.55-274.8' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-3/16" in diameter 275.0' - Bedding plane, horizontal, smooth, tight 275.4' - Fracture, horizontal, rough, undulating, open (3/8"), organic layering		R2), bedding planes transition from wavy to laminar No Recovery 273.1-274.0' Limestone 274.0-276.3' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, very weak (R1), solution cavities up to 1-3/8" by 3/8" over 1-2% of rock surface, bedding laminations with trace organics from 275.2-275.7'	Water level 3' below ground surface —
-	279.0		NA	275.7-276.3' - Fracture zone, fragments up to 1-3/16" in diameter  279.25' - Mechanical break, horizontal, rough, undulating		No Recovery 276.3-279.0'	R16: 11 minutes  R. Bitely begins logging
280							



BORING NUMBER: PROJECT NUMBER: 338884.FL

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

ORIENTATION: Vertical

WATER	LEVELS: 3.0	ft bgs	s on 9/	08/07 START: 9/8/2007 END: 9/	/12/200	7 LOGGER: J. Burkard, R. Bitely,	T. Borton, J. Townes
≳Q⊋	<u>(</u> %			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-237.7 - - - - -	R17-HQ 5 ft 82%	0	5 >10 7	279.45' - Fracture, 60 deg, rough, undulating, tight 279.65-280.0' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-3/16" in diameter 280.3' - Fractures (2), 60 deg, rough, undulating, tight 280.5' - Fracture, 30 deg, rough, undulating 280.7-280.8' - Fracture zone, slight brown staining, fragments up to 3/4" in diameter		Sandy Silt (ML)  279.0-280.0' - yellowish gray to light olive gray, (5Y 7/2, 5Y 5/2), fine to medium grained, mild to moderate  HCI reaction, trace laminated bedding  Limestone  280.0-283.1' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCI reaction, very weak	R17: 9 minutes
-285_ -242.7 -	284.0 R18-HQ		>10 >10	280.95' - Fracture, 60 deg, rough, undulating, tight 281.3' - Fracture, horizontal, rough, undulating, slight brown-black staining, open 1-3/16" calcite crystallization 281.55-281.8' - Fracture zone, fragments up to 3/4" in diameter 281.9, 282.05, 282.25, 282.45, 282.8, 282.85' - Bedding plane (6), horizontal, smooth		- (R1), voids up to 9/16" diameter over 3-4% of rock surface, poorly fossiliferous, bedding plane laminations from 282.0-283.1' No Recovery 283.1-284.0' Limestone 284.0-289.0' - yellowish gray, (5Y 7/2), very fine to coarse grained, moderate HCI reaction, extremely	- - - -
- - - -	5 ft 100%	46	1 1	282.65' - Fracture, rough, undulating, open 284.25-284.4' - Fracture zone, multiple intersecting fractures with rock fragments up to 3/4" in diameter 284.75' - Fracture, 60 deg, rough, undulating, open to 3/8" 285.2' - Fracture, horizontal, rough, undulating, open from 1/2" to 1"		<ul> <li>weak to very weak (R0 to R1), voids up to 3/8" diameter over 5% of rock surface, solution cavities up to</li> <li>1-3/16" in diameter over 5% of rock surface, poorly fossiliferous, trace bedding plane laminations, trace organics</li> </ul>	R18: 9 minutes
290_ -247.7 -	D40 U0		>10	285.3' - Mechanical break 285.4' - Mechanical break or fracture, horizontal, rough, undulating 285.7-285.9' - Fracture zone, rock fragments — up to 1-3/16" 286.4, 286.45, 286.7' - Bedding plane (3), horizontal, smooth		289.0-291.6' - yellowish gray, (5Y 7/2), very fine to coarse grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), voids up to 3/32" over 10% of rock surface, poorly fossiliferous, trace organics	SC-4 collected at 289.75 290.55'
- - - -	R19-HQ 5 ft 52%	22	>10 NR	287.4' - Mechanical break, horizontal, rough, undulating, open to 3/8" 288.1' - Fracture, horizontal, rough, undulating, tight 289.0-289.3' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-3/16" in diameter 289.8' - horizontal, rough, undulating, open to		No Recovery 291.6-294.0'	R19: 10 minutes
- 295 -252.7	294.0		>10	3/8" 290.6-291.6' - Fracture zone, rock fragments up to 1-9/16" in diameter 294.0-294.9' - Fracture zone, rock fragments — up to 1-3/16" in diameter	- - - - - - - -	Limestone 294.0-297.9' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), 60%	-
-	R20-HQ 5 ft 78%	14	>10	295.6-297.0' - Fracture zone, rock fragments up to 1-3/16" in diameter  297.3' - Fracture, horizontal, rough.		_ carbonate sandy silt - -	
- - -	299.0		NR	undulating, tight	- - - - - - - - - -	No Recovery 297.9-299.0'	R20: 19 minutes
300			3	299.3' - Fracture, 45 deg, smooth, trace black organic staining, tight		-	-



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

WATER	LEVELS: 3.0	ft bgs	s on 9/	08/07 START: 9/8/2007 END: 9/	12/2	007	7 LOGGER : J. Burkard, R. Bitely	, T. Borton, J. Townes
≥0.≘	(%)			DISCONTINUITIES	٥		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-257.7 - - - - - -	R21-HQ 5 ft 74%	11	3 NA NA NR	299.5, 299.6, 300.2, 300.3' - Fractures (4), horizontal, rough, undulating, trace black organic staining, tight 301.0' - Fracture zone, rock fragments up to 3/4" in diameter 301.2' - Mechanical break, 20 deg 301.8-301.9, 302.2-302.7' - Fracture zone (2), rock fragments up to 3/4" in diameter			Limestone 299.0-300.3' - yellowish gray, (5Y 7/2), very fine to medium grained, moderate HCl reaction, extremely weak (R0), black organic mottling over 20% of rock surface 300.3-300.7' - olive gray to yellowish gray, (5Y 3/2, 5Y 7/2), very fine grained, extremely weak (R0), organic content decreasing with depth from 1-3/16" lens of organic silt at 300.3' below ground surface, faint	R21: 12 minutes
305 -262.7 - - - - -	R22-HQ 5 ft 90%	40	>10 10 >10 0 4	304.65, 305.4, 305.7, 306.35, 306.75' - Bedding plane or mechanical break (5), <10 deg, smooth to rough, planar to undulating  305.95-306.35' - Fracture zone, rough, undulating to planar, rock fragments <2" in diameter  306.9-307.0' - Fracture zone, rough, undulating, rock fragments <1" in diameter			to mild organic odor, fossiliferous, transition to a carbonate silt with depth  Sandy Silt (ML) 300.7-302.7' - yellowish gray, (5Y 7/2), low to medium plasticity, >50% silt, <50% limestone fragments as sand sized fraction No Recovery 302.7-304.0' Silt (ML) 304.0-304.6' - yellowish gray, (5Y 7/2), low to medium plasticity, mild to moderate HCI reaction, limestone fragments as sand sized fraction	R22: 12 minutes
-310 -267.7 	R23-HQ 5 ft 100%	58	>10 3 >10 6	undulating, rock fragments <1-1/2" in diameter  309.5-309.75' - Fracture zone, rough, undulating, silt lenses, rock fragments <2" in diameter  310.25, 310.9' - Fractures or mechanical break (2), rough, undulating  310.5' - Fracture or mechanical break, 30 deg, rough, undulating  312.0, 312.05, 312.1, 312.2' - Fractures (4), 0-90 deg, rough, undulating  312.45, 313.05, 313.45, 313.95' - Fractures or mechanical break (4), <10 deg, rough, undulating			>50%   Limestone     304.6-305.1' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to strong HCl reaction, extremely weak to weak (R0 to R2), light gray mottling over 40% of surface, moderately fossiliferous casts and molds (1/8-1/4"), laminated organics   Silt (ML)     305.1-305.4' - Same as 304.0-304.6'     Limestone     305.4-308.5' - Same as 304.6-305.1'     No Recovery 308.5-309.0'     Limestone	
315 -272.7 - - - - - - - - - - - - - - - - - - -	R24-HQ 5 ft 98% 319.0	30	2 >10 >10 >10 NR >10	314.9, 315.2' - Fractures or mechanical break (2), 10 deg and 40 deg, rough, undulating 315.7-316.75' - Fracture zone, rough, undulating, silt lenses, rock fragments <3" in diameter  317.1, 317.5' - Fractures or mechanical break (2), 70 deg and 50 deg, rough, undulating 317.5-317.9' - Fracture zone, rough, undulating, rock fragments <3" in diameter 318.2' - Fractures or mechanical break, <10 deg, rough, undulating			309.0-314.0' - yellowish gray, (5Y 7/2), fine to medium grained, moderate to strong HCI reaction, extremely weak to medium strong (R0 to R3), highly variable trace voids 1/16", poorly fossiliferous, trace organic lamination, laminated silty intervals from 311.35-311.5 and 311.65-311.8'	R24: 9 minutes



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

WATER LEVELS : 3.0 ft bgs on 9/08/07

START : 9/8/2007

END : 9/12/2007

LOGGER : J. Burkard, R. Bitely, T. Borton, J. Townes

WATER	LEVELS: 3.0	ft bgs	s on 9/	08/07 START: 9/8/2007 END:	9/12/2	007	LOGGER: J. Burkard, R. Bitely,	T. Borton, J. Townes
≥∩≘	_ (9			DISCONTINUITIES	ပွ	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	SYMBOLIC LOG		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-277.7 -			>10	318.65-318.9' - Fracture zone or mechanical break, rough, undulating, rock fragments <2" in diameter	$\pm$	Ŧ	314.0-318.9' - yellowish gray, (5Y 7/2), fine to medium grained, moderate to strong HCl reaction,	-
-	R25-HQ 5 ft 100%	27	>10	319.3-319.8, 320.1-320.4, 320.6-320.8, 321.7-322.1, 322.35-322.65, 323.2-323.3' - Fracture zone (6), undulating, rock fragments	Ħ	}	extremely weak to medium strong (R0 to R3), highly variable trace voids <1/16", poorly fossiliferous,	-
_			>10	<1" in diameter, friable 319.9, 321.1, 321.2, 321.3, 322.8, 323.8' - Fractures or mechanical break (6), 20 deg,		1	trace organic laminations, interlaminated silt lenses and limestone rock fragments at	-
_	324.0		10	rough, undulating		1	314.4-314.55' and 315.7-316.75' No Recovery 318.9-319.0' Limestone 319.0-324.0' - yellowish gray, (5Y	R25: 9 minutes
325 <u>-</u> -282.7			2	324.45, 324.95, 325.4, 325.8, 326.3' - Fractures or mechanical break (5), <10-30 deg, rough, undulating		-	7/2), very fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to	- -
_	R26-HQ		2	deg, rough, undulating		+	R1), with friable carbonate silts with <50% sand-sized limestone fragments, poorly fossiliferous	-
_	5 ft 100%	42	2 NA	326.7-329.0' - Fractures or mechanical break, smooth to rough, undulating			324.0-326.7' - yellowish gray, (5Y 7/2), very fine to fine grained, extremely weak to very weak (R0 to R1), trace laminated organics	-
-			NA		-	-	325.1-325.7' - Same as 324.0-326.7' except mild to moderate HCI reaction, moderately fossiliferous,	R26: 13 minutes -
330	329.0		>10	329.0-329.3' - Fracture zone, rough, undulating, rock fragments <1" in diameter 329.4, 329.45' - Fractures or mechanical	#	<u> </u>  -	fossil shells to 1/2"  Sandy Silt With Limestone (ML) 326.7-329.0' - very fine to fine grained, low to medium plasticity,	- -
-287.7 -			2	break (2), 40 deg and 20 deg, rough, undulating 329.7, 330.4, 330.85, 331.9' - Bedding plane		} }	mild to moderate HCl reaction, sandy silt (carbonate), carbonate silt with <50% limestone fragments as sand	
_	R27-HQ 5 ft 92%	67	1	or mechanical break (4), <10 deg, rough, undulating		<b> </b>	fraction; limestone interbeds, extremely weak to very weak (R0 to R1), strong to very strong odor (crude petroleum and hydrogen	SC-5 collected at 330.85- 331.9'
-			>10	332.15-332.35' - Fracture zone, rough, undulating, rock fragments <2" diameter		}	Sulfide), poorly fossiliferous  Limestone 329.0-333.6' - yellowish gray, (5Y	- R27: 8 minutes
-	334.0		0 NR			}	7/2), very fine to fine grained, moderate to strong HCl reaction, extremely weak to weak (R0 to R2),	-
335 <u>-</u> -292.7			>10	334.4-334.5, 334.8-334.9, 335.1-335.25, 336.2-336.6, 336.6-337.0, 337.3-338.0, 338.25-338.4' - Fracture zone (7), rough,		1	voids <1/16" over 10% of surface, one cavity or fossiliferous cast 1" in diameter, few cavities <1/4" in diameter, trace organic lenses,	_
-	R28-HQ 5 ft	8	>10	undulating, sandy silt lenses with rock fragments <2" in diameter 335.45, 335.7, 335.95' - Bedding plane or mechanical break (3), <10 deg, rough,		<u> </u>	moderately fossiliferous, trace laminated organics No Recovery 333.6-334.0'	-
-	88%	•	>10	undulating		+		-
-	330 0		>10			‡ ‡		R28: 12 minutes -
340	339.0		NR 2			#	F	J. Townes begins logging
					1	ľ	_	



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ORIENTATION: Vertical

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

START 98/2007   START 98/2007   SED 97/2007   C)GGERT 4, Burbard, R. Blakey, T. Borbon, J. Francisco, J. Burbard, R. Blakey, T. Borbon, J. COMMENTS	-				(00/07 CTART : 0/0/0007 FARD : 0		07 100055 15 15 15 15 15	T Destan I Terrain
DESCRIPTION   Section   DEPTH TYPE OF CHILD   DEPTH OF CASING   NERHALON   TEST   TE	WATER		π bg:	s on 9				
297.7	るも悪	_(%)				98		COIVIIVIEINTO
297.7	ON ON	Z Z Z	~	RES	DESCRIPTION	길		
297.7	ATI	JA FE	%)	FOOT		30 M	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
297.7	E FR -	ORI	Ø	RAC		Ĭ		
10   lens with angular rock fragments up to 34*1 in diameter   339.6* Mechanical break, horizontal, rough, undulating, along bedding plane (9), horizontal, fractures along contact of silt lens   344.0   1   1   344.0   1   1   345.5   345.9   346.4   346.6   346.9   347.6   348.9* Bedding plane (9), horizontal, rough, undulating, light   1   349.0   1   350.35.35   350.35.350.9, 351.85, 352.4* Bedding plane (8), horizontal, rough, undulating, light   1   354.0   356.3   350.35.350.9, 351.85, 352.4* Bedding plane (9), horizontal, rough, undulating, light   1   354.0   359.0   2   350.35.350.9, 351.85, 352.4* Bedding plane (9), horizontal, rough, undulating, light   1   354.0   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   354.0   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2)   0   359.0   2   2   350.3, 350.9, 351.85   352.4* Bedding plane (7), horizontal, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 356.5* Mechanical break (2), 0-90   deg, rough, undulating, light   1   356.3, 35		074	œ	ΗД		S		
R29-HQ   St.   R29   R	-297.7			>10		╨		_
R29-HO   Str.				10				
344.0 344.0 17. 18. 344.0 18. 345.0						Т	moderate to strong HCl reaction,	
Derak, sill tens protection of the protection of	-		62	2		仁		-
1	-	9470				╫		-
343.25 - Fracture, horizontal, rough, undulating, tight  344.0	-			0	341.35, 341.7' - Bedding plane (2),	ᄪ	- carbonate material of low to medium	_
344.0 NR 348.9 Nedding day left (1) Nedding ray, (5) (772), very fine to fine duming rained, moderate dull residue duminations 1 nedding rained, moderate dull residue duminations 1 nedding rained, moderate to strong HCI reaction, revy weak (R) NR 350.7 minutes 2 nedding laminations 1 nedding rained, moderate to strong HCI reaction, revy weak (R) NR 350.7 minutes 2 nedding rained, moderate to strong HCI reaction, revy weak (R) NR 350.7 minutes 350.0 NR 350.3 S.5 350.9 S51.85, 352.4' - Bedding plane or mechanical break (2), 0-90 deg, rough, undulating, tight 352.9, 353.6' - Mechanical break (2), 0-90 deg, rough, undulating 354.0 NR 354.0 NR 355.3 S52.9, 353.6' - Mechanical break (2), 0-90 deg, rough, undulating, open up to 3/8" 0 RS2-10 S52.9 S53.6' - Mechanical break (2), 0-90 deg, rough, undulating, open up to 3/8" 0 RS2-10 S52.9 NR 354.0 NR 355.3 S52.9 S53.6' - Mechanical break (2), 0-90 deg, rough, undulating, open up to 3/8" 0 NR 356.3 S56.3 S66.5' - Mechanical break (2), 0-90 deg, rough, undulating, open up to 3/8" 0 NR 359.0 N	_				horizontal, fractures along contact of silt lens	╁╌		Boo
344 0	_			1	343.25' - Fracture, horizontal, rough,			R29: / minutes
345 - 302.7    348, 345 55, 345.9, 346.4, 346.6, 346.9, 346.9, 347.45, 348.9 - Bedding plane (8), horizontal, rough, undulating, tight   1		344.0		NR	undulating, tight	Н	No Recovery 338.4-339.0'	
348 (3. 345.55, 345.9, 346.4, 346.6, 346.9, 347.45, 348.9' Bedding plane (8), horizontal, rough, undulating, tight  1						Ш		
344, 43, 345, 35, 349, 346, 346, 346, 346, 346, 346, 346, 347, 348, 347, 348, 349, 347, 348, 349, 348, 349, 348, 349, 348, 348, 348, 349, 348, 349, 348, 349, 348, 349, 349, 349, 349, 349, 349, 349, 349	345			1		Т	7/2), very fine to medium gray, (5Y	1
R30-HO   S ft   70   1   1   1   1   1   1   1   1   1						F	moderate HCl reaction, extremely	_
R30-HQ   5 ft   71   3   1   1   3   1   3   1   3   1   3   3	1 -			2		世		-
S   N   T   3   100%   T   3   1   1   3   1   1   3   1   3   1   3   1   3   1   3   1   3   3	-	B20 ⊔O			, G, G	╨		_
100%	-			3		垭	_ yellow	_
1 1 349.0 1 1 1 349.0 1 1 1 349.0 1 1 1 349.0 1 1 1 354.0 1 1 354.0 1 1 354.4 356.3 , 356.5' - Mechanical break (2) 2 350.3 , 356.5' - Mechanical break (2) 2 359.0 1 2 2 359.0 1 2 359.0 1 2 2 359.0 1 2 359.0 1 2 359.0 1 2 359.0 1 2 359.0 1 2 2 359.0 1 2 2 359.0 1 2 359.0 1 2 2 359.0 1 2 359.0 1 2 2 359.0 1 2 359.0 1 2 359.0 1 2 2 359.0 1 2 359.0 1 2 359.0 1 2 359.0 1 2 359.0 1 2 2 359.0 1 2 35	_					ᅪ		_
bedding laminations Limestone 340.340.4 - Same as 3380.339.87 - light gray, (N7), very fine to medium grained, moderate to strong HCI reaction, very weak (R1) horizontal, rough, undulating 435.0 - 36 ft				1				
Hand the store of the state of				'		Ш		00 0 114- 4 -4 047 0
349.0	_					世		
350 -307.7 -307.	-	240.0		1		╁		
fine to medium grained, moderate to surface surface  350 -307.7  -307.	-	349.0				世		Complete drilling at 17:00
-307.7  R31-HQ 5 ft 97% 76 1 2 352.9, 353.6' - Mechanical break (2), 0-90 deg, rough, undulating, undulating, open up to 3/8"  R34-D 355312.7  R32-HQ 5 ft 1 2 352.9, 353.6' - Mechanical break (2), 0-90 deg, rough, undulating, open up to 3/8"  R34.0  R35312.7  R32-HQ 5 ft 1 354.0  R35312.7  -307.	-			0		₩	<ul> <li>fine to medium grained, moderate to</li> </ul>	on 09/09/07, water level at -
R31-HQ 5 ft 97% 76 1 354.0 R32-HQ 5 ft 100% 9 1 356.3, 356.5' - Mechanical break (2)  R32-HQ 5 ft 100% 9 1 359.0 R32-HQ 5 ft 100% 9 2 R32-HQ 5 ft 100% 9 4 1 1 2 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 2 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 1 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R32-HQ 5 ft 100% 9 4 11 356.3, 356.5' - Mechanical break (2)  R35.355 -312.7 R31: 10 minutes  R32: 11 minutes  R32- Mg R32: 11 minutes  R32: 11 minutes  R32: 11 minutes					_	╨		surface
r mechanical break (4), horizontal, rough, undulating, tight  or mechanical break (4), horizontal, rough, undulating, tight  r mechanical break (4), horizontal, rough, undulating, tight  or mechanical break (4), horizontal, rough, undulating, tight  r mechanical break (4), horizontal, rough, undulating, tight  or mechanical break (4), horizontal, rough, undulating, tight  r mechanical break (4), horizontal, rough, undulating, tight  or mechanical break (4), horizontal, rough, undulating, tight  or mechanical break (4), horizontal, rough, undulating, tight  or mechanical break (4), horizontal, rough, undulating, and tight tight undulating tight  or mechanical break (4), horizontal, rough, undulating, and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight tight undulating and tight u	-307.7			2	350.35, 350.9, 351.85, 352.4' - Bedding plane	╁┰		_
351. 10 minutes  354.0	_				or mechanical break (4), horizontal, rough,	$\vdash$		_
fine to medium grained, moderate to strong HCI reaction, very weak to weak (R1 to R2), black and blue mottling over 20% or rock surface, trace laminations 349.0-353.85' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), trace laminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs.  No Recovery 353.85-354.0' Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), trace laminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs.  No Recovery 353.85-354.0' Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous				1	undulating, tight			
weak (R1 to R2), black and blue mottling over 20% or rock surface, trace laminations 349.0-353.85' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), trace laminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs. No Recovery 353.85-354.0' Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), trace laminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs. No Recovery 353.85-354.0' Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous			70	'				
352.9, 353.6' - Mechanical break (2), 0-90 deg, rough, undulating  354.0  NR 1 354.4, 357.0, 357.9' - Fractures (3), horizontal, rough, undulating, open up to 3/8"  R32-HQ 5 ft 100%  1 356.3, 356.5' - Mechanical break (2)  359.0  R32.9, 353.6' - Mechanical break (2), 0-90 deg, rough, undulating  352.9, 353.6' - Mechanical break (2), 0-90 deg, rough, undulating  349.0-353.85' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), trace laminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs. No Recovery 353.85-354.0' Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous  R31: 10 minutes  R31: 10 minutes	1 -					世	strong HCl reaction, very weak to	1
352.9, 353.6' - Mechanical break (2), 0-90 deg, rough, undulating  1 354.0 NR 1 354.4, 357.0, 357.9' - Fractures (3), horizontal, rough, undulating, open up to 3/8"  0 R32-HQ 5 ft 100%  1 356.3, 356.5' - Mechanical break (2)  1 359.0 R32.9, 353.6' - Mechanical break (2), 0-90 deg, rough, undulating  1 354.0, 0-90 deg, rough, undulating  1 354.0, 0-90 deg, rough, undulating  1 354.0, 357.9' - Fractures (3), horizontal, rough, undulating, open up to 3/8"  1 356.3, 356.5' - Mechanical break (2)  1 356.3, 356.5' - Mechanical break (2)  2 R32-HQ 5 ft 100%  1 1 356.3, 356.5' - Mechanical break (2)  2 R32-HQ 5 ft 100%  1 1 356.3, 356.5' - Mechanical break (2)  3 359.0 R31: 10 minutes  1 1 Aylo. 358.85' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), vide up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous  R31: 10 minutes  R31: 10 minutes	1 -			2		╁┈		-
deg, rough, undulating  349.0-353.85 - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), trace laminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs.  No Recovery 353.85-354.0' Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), trace laminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs. No Recovery 353.85-354.0' Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous  R32: 11 minutes	1 -					世	trace laminations	R31: 10 minutes
moderate HCI reaction, weak to medium strong (R2 to R3), trace laminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs.  No Recovery 353.85-354.0' Limestone 359.0  1  356.3, 356.5' - Mechanical break (2)  359.0  moderate HCI reaction, weak to medium strong (R2 to R3), trace laminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs.  No Recovery 353.85-354.0' Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous	1 -			1	deg, rough, undulating	╀		-
355 -312.7  R32-HQ 5 ft 100%  1  356.3, 356.5' - Mechanical break (2)  R359.0  R32-HQ 5 ft 100%  2  R359.0  R359.0  R359.0  1  354.4, 357.0, 357.9' - Fractures (3), horizontal, rough, undulating, open up to 3/8"  R359.0  R62 to R3), trace laminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs.  No Recovery 353.85-354.0' Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous  R32: 11 minutes	1 -	354.0		NR		ш	moderate HCl reaction, weak to	-
aminated bedding with organics, cavities up to 3/8" in diameter are fossil burrows and over 10% of rock surface from 351.0-352.0' bgs.  No Recovery 353.85-354.0' Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous  R32: 11 minutes	1 -			1	354.4 357.0 357.9' - Fractures (3)	╁╌	_ medium strong (R2 to R3), trace	-
R32-HQ Sit   94   1   356.3, 356.5' - Mechanical break (2)  R32-HQ Sit   100%  1   1   1   1   1   1   1   1   1   1						阜		
R32-HQ 5 ft 100%  1  1  356.3, 356.5' - Mechanical break (2)	-312.7			_		上		
Signature 1 1 356.3, 356.5' - Mechanical break (2)  Limestone 354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous	1			'			surface from 351.0-352.0' bgs.	1
354.0-359.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous	1 -					Ъ		1
7/2), very fine to fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous	1 -		94	1	356.3, 356.5' - Mechanical break (2)	F		<u> </u>
medium strong (R2 to R3), voids up to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous	1 -	100 /6				世	7/2), very fine to fine grained,	-
to 3/16" over 50% of rock surface and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous  R32: 11 minutes  R32: 11 minutes	1 -			1		╀		-
and are fossil molds, cavities up to 2" in diameter over 1-2% of rock surface, fossiliferous	-					ᄪ	to 3/16" over 50% of rock surface	P32: 11 minutes
359.0 in diameter over 1-2% of rock surface, fossiliferous	1 -			0		╁╌	and are fossil molds, cavities up to 2"	132. IT fillinutes
	1 -	359.0				丰		_
	1 _			2				
	360							



338884.FL AD-02

SHEET 9 OF 15

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

WATER	LEVELS: 3.0	ft bgs	s on 9	08/07 START: 9/8/2007 END: 9/	12/200	D7 LOGGER: J. Burkard, R. Bitely,	T. Borton, J. Townes
<b>₹</b> Ω ⊊	- (°)			DISCONTINUITIES	او	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU STH, OVEF	D (%)	TUF FOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURF	SOR	RQI	FRA(	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMI	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-317.7		_		359.6' - Mechanical break, horizontal, rough,		Limestone	
1 -			2	undulating, 3/4" relief 359.8' - Mechanical break, vertical, rough,	Н	<ul> <li>359.0-363.9' - yellowish gray, (5Y 7/2), very fine to fine grained,</li> </ul>	1
1 1	R33-HQ			undulating	$\Box$	moderate to strong HCl reaction,	1
1 1	5 ft 98%	62	1	360.2' - Bedding plane, horizontal, rough, undulating, bedding plane fracture along	Ħ	<ul> <li>weak to medium strong (R2 to R3), voids up to 3/16" over 10% of rock</li> </ul>	1
1 1	3370			organic layer		surface and are fossil molds, cavities	1
1 1			2	360.5, 361.3, 362.5, 362.9, 363.55' - Mechanical break, horizontal, rough,	Ш	<ul> <li>up to 3/4" in diameter over 1-2% of rock surface, trace organics,</li> </ul>	1
			1	undulating 361.5' - Mechanical break	Ш	moderately fossiliferous	R33: 8 minutes
	364.0			301.3 - Mechanical break	Ш		1
			<u>NR</u> / 1		Ш	No Recovery 363.9-364.0' Limestone	
365_			'	364.6, 365.45' - Bedding plane, horizontal,	Щ	364.0-366.55' - yellowish gray, (5Y 7/2), very fine to fine grained,	]
-322.7			1	rough, undulating —	Щ	_ moderate HCl reaction, weak to	
					Ш	medium strong (R2 to R3), voids up to 3/16" over 10% of rock surface	]
	R34-HQ 5 ft	82	>10	000 5 000 051 5	Н	and are fossil molds, trace organic	
1 4	98%	-		366.5-366.65' - Fracture zone, rock fragments up to 3/4" in diameter	$\vdash$	laminations, fossiliferous - 366.55-368.55' - white to very light	4
-			1	367.3, 368.3' - Mechanical break (2),	H	gray, (N9 to N8), very fine to fine	SC-7 collected at 367.3-
1 -				horizontal, rough, undulating	H	grained, strong HCl reaction,  medium strong (R3), voids up to 3/8"	368.3' R34: 9 minutes
-			1		H	over 20% of rock surface and are fossil molds, cavities up to 1-3/16"	134. 9 minutes
1 +	369.0		NR)		Ш	<ul> <li>over 5% or rock surface, fossiliferous</li> </ul>	-
			2	369.45, 369.85' - Fractures (2), horizontal,	Ш	368.55-368.9' - Same as 364.0-366.55'	1
370_ -327.7				rough, undulating, tight —	Н	No Recovery 368.9-369.0' Limestone	-
1 -			1	370.5' - Bedding plane, horizontal, smooth,	Ш	369.0-373.55' - yellowish gray, (5Y	1
1 -	R35-HQ			tight, fracture along organic layering	ш	<ul> <li>7/2), very fine to fine grained, moderate HCl reaction, medium</li> </ul>	1
1 1	5 ft 91%	66	>10	371.4-371.5' - Fracture zone, rock fragments up to 3/4" in diameter	ш	strong (R3), voids up to 3/8" over	1
1 1			40	372.1' - Fracture, horizontal, rough,	ш	<ul> <li>20% of rock surface and are fossil molds, trace organic layering,</li> </ul>	1
			>10	undulating, tight	Ш	moderately fossiliferous	1
1 7			0	372.8-373.1' - Fracture zone, rock fragments up to 1-9/16" in diameter	$\mathbb{H}$	_	R35: 8 minutes
	374.0		NR		H	No Recovery 373.55-374.0'	
			4	374.25, 374.4, 374.75, 374.95, 375.3, 375.5,	Ħ	Limestone - 374.0-378.5' - yellowish gray, (5Y	]
375			r	376.45, 377.7, 378.15 - Mechanical break or bedding plane (9), horizontal, rough,	Ħ	7/2), very fine to fine grained, `	_
-332.7			2	undulating, tight	H	moderate HCl reaction, medium strong (R3), voids up to 3/8" over	
	Dog I : 5				出	10% of rock surface and are fossil molds, trace organic layering,	4
-	R36-HQ 5 ft	46	1		믭	<ul> <li>fossiliferous, cavities up to 9/16" over</li> </ul>	-
	90%			0774 077 051 M 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	H	1-2% of rock surface and are dissolution fossil molds	-
			3	377.1, 377.35' - Mechanical break or bedding plane (2), horizontal, rough, undulating, tight	H	-	-
-			1	. ( ),	団	_	R36: 8 minutes
			NR		団	No Recovery 378.5-379.0'	-
	379.0		INIX	379.0-379.3' - Fracture zone, rock fragments	団		-
380			>10	up to 1-9/16" in diameter	Ш	_	-
300					$\Box$		+



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

WATER	LEVELS: 3.0	ft bgs	s on 9/	08/07 START: 9/8/2007 END:	9/12/20	07 LOGGER: J. Burkard, R. Bitely,	T. Borton, J. Townes
≥0 <i>≎</i>	(%			DISCONTINUITIES	ღ	LITHOLOGY	COMMENTS
ELO N (f	AND % ₹		ÆS ⊤	DESCRIPTION	C LC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUF	COF	RQ	FRA	THICKNESS, SURFACE STAINING, AND TIGHTNES	s X	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-337.7			3	379.6, 379.8, 380.0' - Fractures (3), horizontal, smooth, tight	$\top$	Limestone - 379.0-383.1' - yellowish gray, (5Y	
				380.2-380.4' - Fracture zone, rock fragments	$\perp$	7/2), very fine to fine grained,	
	R37-HQ 5 ft	36	1	up to 1-9/16" in diameter 380.8, 381.4' - Fractures (2), horizontal,	$\perp$	moderate HCl reaction, medium strong (R3), voids up to 3/8" over	_
_	82%			rough, undulating, open to 3/4"	$\perp$	20% of rock surface and are fossil molds, fossiliferous	-
-			>10		上	- moids, rossiliterous	-
-			0 /	382.7-382.9' - Fracture zone, rock fragments up to 1-9/16" in diameter	上	No Recovery 383.1-384.0'	R37: 8 minutes
	384.0		NR		世	1 No Recovery 303:1-304.0	-
-	304.0			384.0-384.5' - Fracture zone, rock fragments	$\perp$	384.0-384.5' - yellowish gray, (5Y	-
385			>10	up to 1-9/16" in diameter 384.7, 384.95' - Fractures (2), horizontal,	$\perp$	<ul> <li>7/2), very fine to fine grained, moderate HCl reaction, weak to</li> </ul>	-
-342.7			>10	rough, undulating, 3/4" relief	ightharpoonup	medium strong (R2 to R3), voids up to 3/16" over 20% of rock surface	
]			-10	385.6-385.75' - Fracture zone, rock	Ъ	and are fossil molds, moderately	
]	R38-HQ 5 ft	53	2	fragments up to 3/4" in diameter 386.2, 386.55, 387.15' - Fractures (3),	$\perp$	fossiliferous - 384.5-385.75' - light gray, (N7), very	
	88%			horizontal, rough, undulating, 3/8" relief 386.4-386.8' - Mechanical break	+	fine to coarse grained, strong HCl reaction, medium strong to strong	-
-			1		F	<ul> <li>(R3 to R4), voids up to 3/32" over</li> </ul>	-
-			0		+	10% of rock surface and are fossil molds, cavities up to 3/8" over 3-5%	R38: 8 minutes
-			NR		+	of rock surface 385.75-385.95' - Same as	-
	389.0			389.0-389.9' - Fracture zone, rock fragments	Ħ	384.5-385.75' except organic	-
390			>10	up to 1-9/16" in diameter	Ħ	laminated limestone 385.95-388.4' - Same as	-
-347.7			. 40	390.0' - Fracture, vertical, rough, undulating,	7#	384.0-384.5' No Recovery 388.4-389.0'	
]			>10	tight 390.1, 390.3' - Fractures (2), horizontal,		Limestone	
]	R39-HQ 5 ft	9	>10	rough, undulating, tight 390.5-390.6' - Fracture zone, rock fragments	$\perp$	389.0-391.7' - yellowish gray, (5Y 7/2), very fine to fine grained,	
]	54%	ŭ		up to 3/4" in diameter	$\perp$	moderate HCl reaction, very weak (R1), voids up to 1/16" over 1-2% of	_
				390.8, 391.95, 391.2' - Fractures (3), horizontal, rough, undulating, tight	$\pm$	rock surface, poorly fossiliferous,	_
_			NR	391.5' - Mechanical break	+	trace organic laminations  No Recovery 391.7-394.0'	R39: 8 minutes
-					$\mathbf{H}$	<del>-</del>	-
-	394.0				$\perp$	_ Limestone	-
395			1		$\perp$	- 394.0-399.0' - yellowish gray, (5Y 7/2), very fine to fine grained,	-
-352.7				395.0, 395.4, 395.75, 396.0, 396.4' -	工	moderate HCl reaction, very weak to	_
			3	Fractures (5), horizontal, rough, undulating, tight to open	上	<ul> <li>weak (R1 to R2), voids up to 3/16"</li> <li>over 10% of rock surface and are</li> </ul>	1
]	R40-HQ 5 ft	46	>10			fossil molds, moderately fossiliferous, trace laminations	
]	100%	40	- 10	396.7-397.1' - Fracture zone, rock fragments	上	ioooniiorouo, trace lattiitationo	
			4	up to 1-3/16" in diameter	上	<u> </u>  -	
			·	397.45, 397.65, 397.9' - Fractures (3), horizontal, rough, undulating, tight	廿	<u> </u>  -	P40: 6 minutes
			>10	398.3-399.0' - Fracture zone, rock fragments	$\perp$	-	R40: 6 minutes
-	399.0			up to 1-9/16" in diameter		-	-
100			4		+	+	-
400							



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#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 3.0 ft bgs on 9/08/07 START: 9/8/2007 END: 9/12/2007 LOGGER: J. Burkard, R. Bitely, T. Borton, J. Townes DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -357.7 399.2, 399.6, 399.8, 400.0, 400.2, 400.4, Limestone 4 400.6, 400.9, 401.05, 401.45, 402.05' -399.0-402.45' - yellowish gray, (5Y 7/2), very fine to fine grained, Fractures (11), horizontal, rough, undulating, tight, to 3/8" relief moderate HCI reaction, weak (R2), R41-HQ 2 voids up to 3/32" over 20% of rock 31 5 ft surface and are fossil molds. 69% moderately fossiliferous 1 No Recovery 402.45-404.0' NR R41: 6 minutes 404 0 Limestone 404.0-408.3' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to 3 404.5, 404.75, 404.9, 405.15, 405.35, 405.95, 405 406.1, 406.2, 406.4, 406.7, 406.85, 407.1' --362.7 Fractures (12), horizontal, rough, undulating, 3 medium strong (R2 to R3), voids up tight open to 3/8" over 10% of rock surface and are fossil molds, secondary quartz R42-HQ 406.0' - Fracture zone, fragments up to >10 1-9/16" in diameter mineralization found in fractured 5 ft 25 86% material near bottom of run, trace organic laminations near top of run >10 407.4-408.3' - Fracture zone, fragments up to 1-9/16" in diameter, quartz grains up to 3/8 found as infill material R42: 8 minutes No Recovery 408.3-409.0' NR 409.0 409.1, 409.25, 409.45, 410.85, 411.35, 412.85, 413.2, 413.7, 413.9' - Bedding plane or mechanical break (9), <10 deg, rough, Complete drilling at 15:15 Limestone >10 409.0-414.0' - yellowish gray, (5Y on 09/10/07 due to 7/2), very fine to medium grained, strong HCl reaction, extremely weak 410 proximal lighting, water -367.7 level at surface undulating, tight to open 1/2" 409.7-410.05' - Fracture zone, rough, to very weak (R0 to R1), laminated 1 R. Bitely begins logging organics over 20% of rock surface, voids <1/16" over <10% of rock surface especially along bedding undulating, rock fragments with carbonate silt matrix, fragments <1" in diameter R43-HQ 58 1 5 ft 100% planes, trace cavities up to 1' diameter, carbonate silt and limestone fragments at 409.7-410.5', 1 carbonate clay/silt with limestone fragments at 412.8-413.0' R43: 8 minutes 3 414.0 414.0-416.6' - yellowish gray, (5Y 7/2), very fine to medium grained, >10 414.5-415.0' - Fracture zone, rough, 415 moderate to strong HCI reaction, undulating, rock fragments <2" in diameter -372.7 extremely weak to very weak (R0 to 415.2, 415.4, 416.35, 416.5, 418.35, 418.45, 10 R1), voids <1/16" over 30% of 418.55' - Bedding plane or mechanical break, surface, few cavities 1/2" in diameter, <10 deg, rough, undulating, tight to open 1/2" moderately fossiliferous R44-HC 415.6-415.85' - Fracture zone, rough, NA 26 5 ft undulating, rock fragments <2" in diameter 416.55-416.7, 417.1-417.15, 417.4-417.45, 94% Organic Elastic Silt To Organic Fat Clay (MH-CH) 417.65-418.05' - Fracture zone (4), rough, undulating, organic silt and rock fragments 416.6-417.4' - dark greenish gray, NA (5G 4/1), no HCl reaction, extremely <2" in diameter with carbonate silt lenses weak (R0), laminated, poorly R44: 10 minutes 3 interbedded fossiliferous, moderate hydrogen sulfide odor NR 419.0 >10 420



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

				IENT : BESOUT S/N 1517, Muu Total y, HQ tools, HW Cas		ORIENTATION : Vertical
WATER	LEVELS : 3.0	πbgs	on 9		12/20	
≷Q£	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	<u>8</u>	LITHOLOGY COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	ÄAN. ≪∀.	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINISTRALOGY, TEXTURE SIZE AND DEPTH OF CASING,
A B B B B B B B B B B B B B B B B B B B	J. H.	(%) O	T. 6	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	OLI	WEATHERING LARRINGS FLUID LOSS, CORING RATE AND
FR	NG NG	Ω	RAC ER F	PLANARITY, INFILLING MATERIAL AND	, MB	AND ROCK MASS SMOOTHINESS, CAVING ROD
E S E	CC EE PRE	ď	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS BNOT 9, TEST RESULTS, ETC.
-377.7				419.0-419.4, 419.6-419.7, 419.8-420.4,	Ш	Limestone
-			>10	421.75-422.4, 422.65-423.4' - Fracture zone (5), silt infilling, rock fragments <2" in	T	417.4-418.7' - yellowish gray, (5Y - 7/2), very fine to medium grained,
-	I R45-HQ			diameter	匚	moderate to strong HCl reaction,
-	5 ft	13	>10	419.5, 420.6, 420.9, 421.65' - Bedding plane	╂ᆣ	extremely weak to very weak (R0 to
-	88%			or mechanical break (4), <10 deg, rough,		R1), voids <1/16" over 30% of
			>10	undulating, tight, open <1/2"	$oldsymbol{\perp}$	surface, few cavities 1/2" in diameter, moderately fossiliferous
			/10			No Recovery 418.7-419.0'
_			>10		┰	Limestone R45: 8 minutes
-			NR		$\Box$	419.0-423.4' - yellowish gray, (5Y
_	424.0		.,,,		+	7/2), very fine to medium grained, moderate HCl reaction, extremely
-			>10			- weak to very weak (R0 to R1),
425_				424.5' - Bedding plane or mechanical break, horizontal, rough, undulating —	$oldsymbol{\perp}$	interbedded carbonate silt lenses,
-382.7			. 40	424.8-424.9, 425.1-425.6, 426.2-426.3,		voids <1/16" over 10% of surface,
			>10	427.1-428.0' - Fracture zone (4), rough,		- cavity up to 0.5' long from - 421.75-422.25' with crystalline quartz
-	R46-HQ			undulating, rock fragments <2" in diameter 425.9, 426.75' - Fractures or mechanical	╁	growth, laminated bedding over 10%
-	5 ft	16	>10	break (2), <10 deg, rough, undulating, tight,	仜	- of surface -
_	80%			open <1/2"	╁┬	No Recovery 423.4-424.0' Limestone
_			>10			- 424.0-428.0' - yellowish gray, (5Y -
_					┢	7/2), very fine to medium grained,
						moderate HCl reaction, extremely R46: 12 minutes
_	429.0		NR		$\vdash$	<ul><li>weak to medium strong (R0 to R3), variable voids &lt;1/16" over 30% of</li></ul>
-	423.0					rock surface from 424.0-424.5', trace
-			>10	429.3, 429.6' - Mechanical break (2), 50 deg	+	voids , <1/16" of remaining core,
430 -387.7				and 60 deg 429.85-430.15, 430.6-431.0, 431.8-432.7,	仜	laminated organics from 424.5-424.8' over 20%, trace grayish blue (5PB
-307.7			>10	433.0-433.6' - Fracture zone (4), rough,	┢┼	5/2) mottling over core from
_			. •	undulating, rock fragments <2" in diameter		425.6-427.0', all poorly fossiliferous
	R47-HQ	_		431.2, 431.7' - Bedding plane or mechanical	$\vdash$	No Recovery 428.0-429.0' Limestone
_	5 ft 92%	8	>10	break (2), horizontal and 30 deg, smooth to	ш	429.0-433.6' - yellowish gray to
-	02,0			rough, undulating, intersection at 431.2'	╁	grayish black, (5Y 7/2 to N2), strong
_			>10		亡	HCI reaction, extremely weak to
_					╀	medium strong (R0 to R3), organic
l _			>10			lenses up to 1" thick comprising 20%
	434.0		NR			of core especially 432.0-432.6',
I -			NIA.			- mottled coloration along bedding □ planes, especially in stronger □
435			NA			limestone, poorly fossiliferous, trace
-392.7				_		voids <1/16"
-			NA			No Recovery 433.6-434.0'
-	D40.110					- \434.0-434.3' - light gray, (N7), very -
_	R48-HQ 5 ft	48	>10	436.35' - Bedding plane or mechanical break,		fine grained, mild HCl reaction,
_	100%	. •		horizontal, rough, stepped to undulating, tight		_    Strong (R4)
I -						Organic Carbonate To Coal Seam 434.3-434.6' - black to greenish
-			0	437.35' - Mechanical break	1-	black, (N1 to 5GY 2/1), no HCl
-					仜	reaction, laminated, friable R48: 13 minutes
-			3	438.25' - Bedding plane or mechanical break,	+	<del> </del>
-	439.0			horizontal, rough, stepped to undulating, tight 438.75, 438.9' - Fractures or mechanical		<u> </u>
_			>10	break (2), 50 deg and 80 deg, rough,	+	<u>-</u>
440				undulating	Ш	<u> </u>



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

WATER	LEVELS: 3.0	ft bgs	s on 9/	08/07 START: 9/8/2007 EN	ND: 9/12/20	007	LOGGER : J. Burkard, R. Bitely	/, T	. Borton, J. Townes
≥∩≘	_ (9			DISCONTINUITIES		L	LITHOLOGY		COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTN	Ξ		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS		SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-397.7			>10	439.0-439.3, 439.5-440.15, 440.7-441.1, 441.9-442.2' - Fracture zone (4), rough,		$\mp$	Clay (CL) 434.6-436.2' - dark greenish gray,	F	-
-	   R49-HQ   5 ft	11	>10	undulating, rock fragments <2" in diameter 440.35, 440.6, 441.8' - Fractures or mechanical break (3), <10 deg, rough,		TI	(5GY 4/1), carbonate, varve-like laminated organics, few silica nodules to subhedral quartz up to		-
-	64%		>10	undulating, open <1/2"		-	1/2" diameter at 435.2' Limestone		-
-			NR			-	436.2-439.0' - dark greenish gray, (5GY 4/1), very fine to fine grained, strong HCl reaction, medium strong to strong (R3 to R4), laminated,		R49: 14 minutes
- - 445	444.0		>10	444.0-445.5' - Fracture zone, multiple intersecting fractures with rock fragments υ to 1-9/16" in diameter	up 💾	1	varve-like organic laminations, trace limestone casts or secondary carbonate mineralization up to 1" diameter, poorly fossiliferous		-
-402.7 -			>10	445.1, 445.9' - Fractures (2), 45 deg, rough undulating, tight	h, —		439.0-439.7' - yellowish gray, (5Y 7/2), mild HCl reaction, weak to medium strong (R2 to R3), with		
-	R50-HQ 5 ft 66%	7	3	446.4' - Fracture, 45 deg, rough, undulating	g, 📙	+	interbedded carbonate silt lenses, voids <1/16" over 20% of surface, poorly fossiliferous, 1/4" organic peat		-
_			0	446.5' - Mechanical break 446.9, 447.0' - Fractures (2), horizontal,		1	lens at 439.35' Silt (ML)		-
-	440.0		NR	rough, undulating, tight		‡	439.7-440.2' - medium plasticity, <50% limestone fragments as sand sized fraction, organic peat lens at 440.2'		R50: 16 minutes
-	449.0		3	449.45' - Fracture, 45 deg, rough, undulatir		‡	Limestone 440.2-441.25' - medium light gray to		J. Townes begins logging
450 -407.7			>10	tight 449.7, 449.95' - Fractures (2), horizontal,	g,	╁	yellowish gray, (N6 to 5Y 7/2), mild HCl reaction, strong (R4), voids <1/16" over 30% of rock surface,		
-	R51-HQ			rough, undulating, tight 450.5' - Fracture, horizontal, rough, undulating, tight		+	cavities <1" diameter over 10% of surface, mottled coloration due to		-
_	5 ft 66%	24	>10	450.9-451.2' - Fracture zone, rock fragmen up to 1-9/16" in diameter 451.6-452.3' - Fracture zone, rock fragmen		‡	secondary mineralization of cavities, organic associated with cavities, with calcite crystals at 440.2-441.25' and		-
_				up to 1-9/16" in diameter		1	441.27-442.2' 441.25-442.2' - moderate yellowish		-
-	454.0		NR		F	1	brown, (10YR 5/4), very weak to weak (R1 to R2), faintly laminated organics		R51: 9 minutes
455			>10	454.0-455.5' - Fracture zone, multiple, high angle, intersecting fractures, rock fragment up to 2-3/8" in diameter		}	No Recovery 442.2-444.0' Limestone 444.0-447.3' - medium light gray,		-
-412.7 _			>10	455.6, 456.0, 456.4, 456.9, 457.0, 457.1' -	干	F	(N6), very fine grained, strong HCl reaction, strong (R4), voids up to 3/32" over 20% of rock surface.		-
_	R52-HQ 5 ft	28	>10	Fractures (6), horizontal, rough, undulating tight 456.6-456.7' - Fracture zone, rock fragmen	), <u> </u>	‡	cavities up to 9/16" over 1-2% of rock surface and some are filled with quartz crystallization		-
-	82%		>10	up to 3/4" in diameter 457.45-457.65' - Fracture zone, rock		1	No Recovery 447.3-449.0'		-
-				fragments up to 1-3/16" in diameter	片	1			R52: 15 minutes
-	459.0		NR	459.0-459.3' - Fracture zone, rough,		1			-
460			>10	undulating, rock fragments <2" in diameter		‡			-



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ORIENTATION: Vertical

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

WATER	LEVELS: 3.0	ft bgs	s on 9/	08/07 START: 9/8/2007 END: 9	/12/20	07 LOGGER : J. Burkard, R. Bitel	у, Т	T. Borton, J. Townes
≥D≎	(%			DISCONTINUITIES	ğ	LITHOLOGY		COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	3 Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS		SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-417.7 -		œ	>10	459.9-460.05' - Fracture zone, rough, undulating, rock fragments <1" in diameter 460.3-460.75' - Fracture zone, rough,		Limestone - 449.0-452.3' - light brownish gray to light brown, (5YR 6/1 to 5YR 6/4),		-
-	R53-HQ 5 ft 80%	46	3	undulating, rock fragments <3" in diameter, 2 vertical fractures from 460.4-460.7' 460.85, 461.25, 461.95, 462.3' - Bedding plane or mechanical break (4), rough, undulating, tight, open to <1/2"		very fine to fine grained, strong HCI reaction, strong (R4), carbonate sandy silt lens from 451.6-451.8' is extremely weak rock, voids up to 3/16" over 5% of rock surface and		-
_ _	464.0		NR	461.5' - Mechanical break		are filled with crystallization, trace organic laminations at 451.5' No Recovery 452.3-454.0' Limestone		R53: 14 minutes -
- 465_ -422.7			>10	464.3' - Fractures (3), horizontal and vertical, rough, undulating, tight, three intersecting fractures		454.0-458.1' - light brownish gray to light brown, (5YR 6/1 to 5YR 6/4), very fine to fine grained, strong HCl reaction, strong (R4), voids up to	Г	- 
-	R54-HQ 5 ft	0	NA NA	464.6-465.4' - Fracture zone, rock fragments up to 1-3/16" in diameter 465.6-465.9' - Fracture zone, rock fragments up to 3/4" in diameter		<ul> <li>3/16" over 5% of surface, trace organic laminations at 456.9'</li> <li>No Recovery 458.1-459.0'</li> <li>Limestone</li> </ul>		- - -
-	78%		NA	466.2' - Bedding plane, horizontal, rough, undulating, tight 466.5-467.9' - Fracture zone, rock fragments up to 1-9/16" in diameter	-	459.0-463.0' - light gray to yellowish gray, (N7 to 5Y 7/2), very fine to fine grained, weak to strong (R2 to R4), voids <1/16" over <10% of rock,		-
-	469.0		NR	469.0-469.6' - Fracture zone, multiple high		cavities <3/4" from 462.0-463.0', trace laminated organics, cavity infilling, crystalline growth of calcite/aragonite, very weak to weak		R54: 10 minutes
- 470 -427.7			>10	angle, intersecting fractures, rock fragments up to 2-3/8" in diameter 469.9' - Fracture, horizontal, rough, undulating		transition from 461.25-461.55' No Recovery 463.0-464.0' Limestone 464.0-464.9' - light brownish gray to		- -
-	R55-HQ 5 ft   98%	44	2	470.1' - Bedding plane, horizontal, smooth, stepped, intersecting fractures, rock fragments up to 2-3/8" in diameter 470.2' - Fracture, 30 deg, rough, undulating,		light brown, (5YR 6/1 to 5YR 6/4), very fine to fine grained, strong HCI reaction, medium strong to strong (R3 to R4), trace organic increasing		-
- - -			2	tight 470.5' - Fracture, 45 deg, rough, undulating, tight 471.75, 472.0, 472.15, 472.75, 473.1' -		with depth, voids up to 3/32" over 1-2% of rock surface Silt With Limestone Fragments (ML) 464.9-465.9' - fine grained, strong		- R55: 12 minutes
- -	474.0		1 (NR) 3	Fractures (5), horizontal, rough, undulating, except 45 deg at 472.75'  474.3' - Fracture, horizontal, rough,	上	HCI reaction, extremely weak (R0), with limestone fragments, high organic content, strong organic odor Limestone		Complete drilling at 17:00 on 09/11/07, water level at
475 <u> </u>			4	undulating, tight 474.7' - Fracture, 30 deg, rough, undulating, tight 474.9' - Fracture, horizontal, rough,		465.9-466.5' - Same as 464.0-464.9'  Silt With Limestone Fragments (ML)  466.5-467.9' - Same as 464.9-465.9'  No Recovery 467.9-469.0'		surface
- -	R56-HQ 5 ft 100%	36	>10	undulating 475.3' - Fracture, 30 deg, rough, undulating, tight 475.9' - Fracture, horizontal, rough,	1	Limestone  469.0-473.9' - light brownish gray to light brown, (5YR 6/1 to 5YR 6/4), very fine to fine grained, strong HCl		- -
-			3 >10	undulating, high relief at 3/4" 475.6, 475.9' - Fractures (2), horizontal, rough, undulating, tight 476.4, 475.9' - Fracture zone, horizontal,	臣	reaction, medium strong to strong (R3 to R4), voids up to 3/16" over 20% of rock surface and are fossil molds, moderately fossiliferous, trace		R56: 15 minutes
- 480	479.0		1	rough, undulating, tight, rock fragments to 3/4"		organics near top of run No Recovery 473.9-474.0'		-
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9-02 SHEET 15 OF 15

### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723982.5 N, 457716.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 3.0 ft bgs on 9/08/07 START: 9/8/2007 END: 9/12/2007 LOGGER: J. Burkard, R. Bitely, T. Borton, J. Townes DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -437.7 476.75, 477.0, 477.65, 478.0, 478.35 Limestone 4 Fractures (5), horizontal, rough, undulating, 474.0-479.0' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to tiaht 478.6-478.8' - Fracture zone, rock fragments strong HCl reaction, medium strong R57-HQ to strong (R3 to R4), voids up to 3/16" over 10% of rock surface and up to 1-3/16" in diameter 37 >10 5 ft 96% 479.6, 480.15, 480.45, 480.6, 480.95, 481.25' are fossil molds, cavities up to 3/8" diameter over 1-2% of rock surface, - Fractures (6), horizontal, rough, undulating, 3 481.5-481.8' - Fracture zone, rock fragments moderately fossiliferous, secondary to 3/4" diameter mineralization from 478.0-479.0' R57: 12 minutes >10 479.0-483.8' - yellowish gray to light gray, (5Y 7/2 to N7), very fine to fine 481.9, 482.1, 482.75, 482.95, 483.2, 483.4' -Fractures (6), horizontal, rough, undulating, 484 0 NR open to 3/4" grained, mild to strong HCI reaction, 482.85' - Fracture, vertical, rough, undulating, medium strong to strong (R3 to R4), >10 with and extremely weak carbonate tiaht 485 sandy silt lens from 481.5-481.8', 483.55-483.7' - Fracture zone, rock -4427 fragments up to 1-3/16" in diameter voids up to 3/8" over 10% of rock 4 484.0-484.5' - Fracture zone, rock fragments surface and are fossil molds, trace SC-9 collected at 485.8up to 2" in diameter organics, moderately fossiliferous R58-HQ 486.85 484.85, 485.0, 485.3, 485.4, 485.8, 486.9, No Recovery 483.8-484.0' 2 5 ft 42 487.0' - Fractures (7), horizontal, rough, Limestone 76% 484.0-487.8' - light brownish gray, (5YR 6/1), very fine to fine grained, mild to strong HCl reaction, strong undulating, tight 1 487.2' - Fracture, horizontal, rough, undulating, open to 3/4" (R4), voids up to 3/16" diameter over R58: 11 minutes NR 20% of rock surface are fossil molds, quartz crystallization at 487.2', 489.0 1-9/16" diameter and contains 489.2' - Fracture, horizontal, rough, carbonate crystallization 3 undulating, aragonite crystallization No Recovery 487.8-489.0' 490 489.45, 489.9' - Fractures (2), horizontal, Limestone 447.7 rough, undulating, tight 489.0-493.05' - light brownish gray, 0 (5YR 6/1), very fine to fine grained, mild to strong HCl reaction, strong R59-HQ (R4), voids up to 3/16" over 10% of 64 >10 491.45-491.6' - Fracture zone, rock rock surface and are fossil molds. 81% fragments up to 1-3/16" in diameter cavities up to 1-3/8" over 1% of rock surface are filled with carbonate 1 492.4' - Fracture, horizontal, rough, crystallization and found from undulating, tight 489.0-490.0', moderately R59: 12 minutes fossiliferous NR No Recovery 493.05-494.0' 494.0 Limestone 494.2, 494.3, 494.45, 494.75, 495.1, 495.55, 494.0-498.4' - light brownish gray, 5 495.9' - Fractures (7), horizontal, rough, 495 (5YR 6/1), very fine to fine grained, undulating, trace brown staining, tight mild to strong HCl reaction, medium -452.7 strong to strong (R3 to R4), 4 495.65' - Fracture, vertical, rough, undulating. carbonate sandy silt, extremely weak tight, intersecting with horizontal fractures at rock from 497.3-497.9', voids up to 495.55 and 495.9' 3/16" over 10% of rock surface and 4 R60-HQ 496.2, 496.45, 496.65' - Fractures (3), are fossil molds, cavities up to 9/16" 6 ft 19 diameter over 1% of rock surface horizontal, rough, undulating, tight and are filled with aragonite >10 497.0' - Fracture, 0-90 deg, rough, undulating crystallization, trace organics to stepped, tight 497.3-497.6' - Fracture zone, rock fragments R60: 10 minutes, 6' run to 1 up to 3/4", soft material 500' below around surface No Recovery 498.4-500.0' 498.15' - Fracture, horizontal, rough, undulating, tight 9/12/07 at 10:30, total NR depth at 500.0' below 500 500.0 ground surface Bottom of Boring at 500.0 ft bgs on



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SHEET 1 OF 16

#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 8/16/2007 END: 8/24/2007 LOGGER: P. De Sa'rego, J. Townes, R. Bitely, M. Faurote, C. Sump DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS -157.6 200.0-200.6' - Fracture, vertical, rough, Boring AD-3 blind drilled to Limestone 200.0 >10 undulating, open 200.0-203.6' - light olive gray to approximately 200 feet 200.6-201.4' - Fracture zone, angular fragments, 1-3" in size yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, moderate HCl reaction, below ground surface before beginning weak to medium strong (R2 to R3), sampling/logging.
"Water level is based on >10 trace voids (<1/16") 201.4-201.5' - horizontal black 201.7-202.2' - Fracture zone, angular Ground Water Monitoring R1-HQ fragments, 1" to 2-1/2" at LNP site (FSAR Table 0 >10 organic laminae 5 ft 202.4' - Fracture, horizontal, smooth, 2.4.12.08)"
Logger: C. Sump (limited 100% undulating, open 202.8-203.1' - horizontal black 202.5-202.7' - Fracture (3), 60 deg, rough, undulating, 1/8" relief organic laminae >10 space in header) Approximately 1.8' of 203.6-205.0' - pale yellowish brown, 202.9' - Fracture, horizontal, rough, (10YR 6/2), fine grained, moderate slough (from 0.0-200.0' undulating, open HCI reaction, weak to medium strong drilling) removed from top >10 203.1-204.7' - Fracture zone, fragments (R2 to R3), 30% voids (<1/16"), trace 205 205.0 1/4-3" casts/cavities (<1/16") R1: 12 minutes -162<u>6</u> 204.7-205.0' - Fracture zone, fragments 2-3" 205.0-207.1' - light olive gray to >10 205.0-205.5' - Fracture zone, fragments 1/2' medium gray, (5Y 5/2 to N5), fine to 2" in size grained, moderate HCI reaction, 205.5-206.5' - Fracture zone, fragments medium strong (R3), trace medium >10 1/4-1" in size 15:25: Segment of R2 R2-HQ to coarse subrounded fragments 205.8, 206.0, 207.1, 207.3, 207.4, 207.5, 0 207.5, 207.6, 207.7, 207.8, 207.9 - Fractures or bedding plane (11), horizontal, rough, 206.5-207.1' - 5 to 10% voids to clogged, removed for 4 ft logging and resumed R2 -100% 1/16", trace cavities up to 3/4 x 9 HQ at 206.5' 1-3/16" planar to undulating, 1/8" open 207.1-209.0' - pale yellowish brown to yellowish gray, (10Y 5/4 to 5Y 7/2), Driller's Remark: R2 - HQ 208.1, 208.15, 208.2' - Fractures or bedding was a 4.0' run due to >10 plane (3), smooth to rough, planar to fine grained, weak HCI reaction, blockage in core barrel 209.0 undulating, 1/8-1/4" open 208.3-208.6' - Fracture zone, smooth to trace voids to 1/16", strong HCI R2: 14 minutes reaction in pulverized material >10 rough, planar to undulating, 1/4-2" open 209.0-209.85' - grayish orange pink, 210 208.6-209.0' - Fracture zone, fragments 2-3" (5YR 7/2), fine grained, moderate 167.6 209.0-209.85' - Fracture zone, multiple high 4 HCI reaction, medium strong to angle intersecting fractures, rock fragments strong (R3 to R4), voids (<3/16") R3-HQ up to 1/8" 8 over 70% of surface, moderately 4 ft 210.25' - Bedding plane, horizontal, smooth 43% fossiliferous 210.3' - Fracture, vertical, rough, undulating, 209.85-210.7' - moderate orange NR <1/16" open pink, (5YR 8/4), very fine grained, mild to moderate HCl reaction, weak 210.4' - Fracture, horizontal, rough, undulating, 3/8" open to medium strong (R2 to R3), voids 213.0 210.6' - Fracture, vertical, rough, undulating, over 10% of surface, cavities up to <1/16" open R3:15 minutes 3/8" over 1% of surface, laminated, >10 213.0-213.4' - Fracture zone, multiple high very poorly fossiliferous angle intersecting fractures, rock fragments No Recovery 210.7-213.0' up to 1/8" Limestone >10 213.6' - Fracture, horizontal, rough, 213.0-217.0' - grayish orange pink, 215 undulating, 3/8" open (5YR 7/2), very fine grained, mild to 172.6 214.05' - Fracture, rough, undulating, 3/16" moderate HCI reaction, medium >10 open strong (R3), voids <1/16" over 50% R4-HQ 214.25-216.15' - Fracture zone, multiple high of surface, few cavities up to 3/4", 6 6 ft angle intersecting fractures, rock fragments poorly fossiliferous 67% up to 1-9/16" >10 216.3, 216.55, 216.65' - Fracture (3), horizontal, smooth, bedding plane, very low No Recovery 217.0-219.0' R4:16 minutes 216.65-217.0' - Fracture zone, multiple high NR angle intersecting fractures, rock fragments up to 1-3/16" 219.0 219.0-220.8' - Fracture zone, multiple high J. Townes continues >10 angle intersecting fractures, rock fragments logging 220 up to 1-3/16"



PROJECT NUMBER:

33884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

WATER	LEVELS: 5.8	8 ft b	gs on 9/13/07 START : 8/16/2007 Ef		8/24/200				
≥∩≎	(%			DISCONTINUITIES	၂ ပွ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		L KES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
ACE	E.F.	(%)	7.00 .00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	OF I	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND		
EPTI URF,	ORE	R Q D (%)	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	, WB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
	225	ď	E E	THICKNESS, SURFACE STAINING, AND TIGHTNES	s ís	CHARACTERISTICS			
-177.6 -			>10			Limestone 219.0-220.8' - yellowish gray to			
_					$\Box$	grayish orange pink, (5Y 7/2 to 5YR	_		
l _	R5-HQ 5 ft	0			」口	7/2), very fine to fine grained, moderate HCl reaction, weak to			
	36%	U			H	medium strong (R2 to R3), voids			
			NR		H	<1/16" over 5% of surface, poorly fossiliferous			
						No Recovery 220.8-224.0'	1		
-					14	-	R5:13 minutes		
_	224.0				$\Box$		_		
-						Limestone			
225			2	224.7-224.9' - Fracture, 10 deg, rough,	<u></u>	224.0-226.9' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl			
-182.6				undulating, high relief (3/4") due to fossil		reaction, weak to medium strong (R2			
-			>10	molds 225.2-226.9' - Fracture zone, multiple high	† † †	to R3), voids <1/16" over 60% of surface, cavities up to 3/8" over 10%			
-	R6-HQ			angle intersecting fractures, rock fragments	╂┷╂	of surface, fossil molds, moderately	-		
-	5 ft	12	>10	up to 1-3/16"	$\Box$	fossiliferous	-		
-	58%					No Recovery 226.9-229.0'	-		
-					+++		-		
-			NR		+		R6:5 minutes		
-							-		
-	229.0					Limestone	-		
-			>10	229.4' - Fracture, 10 deg, rough, undulating,	+	229.0-231.3' - yellowish gray, (5Y	-		
230_ -187.6				~3/32" open, thin black material over 25% of	$+\Box$	7/2), fine grained, moderate HCI reaction, weak (R2), voids up to	_		
-107.0			>10	fracture surface 229.55' - Fracture, 10 deg, rough, undulating,		1/16" over 20% of surface, cavities	_		
-	D=0			<1/16" open	+	up to 3/4" over 1-2% of surface, fossil molds, poorly fossiliferous,	_		
_	R7-HQ 5 ft	0	_>1_	229.7-231.0' - Fracture zone, multiple high angle intersecting fractures, rock fragments		trace laminations	_		
_	46%			up to 1-3/16"		No Recovery 231.3-234.0'	_		
_				231.0' - Fracture, vertical, rough, undulating, ~3/8" open	╌		_		
l _			NR	oro open			_		
							R7:7 minutes		
	234.0								
1			>10	234.0-234.5' - Fracture zone, multiple high angle intersecting fractures, rock fragments		Limestone 234.0-235.5' - yellowish gray, (5Y	]		
235			-10	up to 1-3/16"	出	7/2), very fine grained, moderate HCI	]		
-192.6			>10	234.9-235.5' - Fracture zone, multiple high	$\top$	reaction, weak (R2), voids <1/16"			
_			. , ,	angle intersecting fractures, rock fragments up to 1-3/16"	$\Box$	over 5% of surface, cavities up to 1" over 1-2% of surface, fossil molds,	1		
_	R8-HQ			•		trace laminations, poorly fossiliferous	]		
_	5 ft 30%	8			1++	No Recovery 235.5-239.0'	1		
-			ND						
-			NR				1		
-					1++		R8:7 minutes		
-	230 0								
-	239.0			239.0-240.0' - Fracture zone, multiple high			<u>-</u>		
240			>10	angle intersecting fractures, rock fragments	╂┼		-		
240				up to 1-9/16"	冊				
					-				

ORIENTATION : Vertical



PROJECT NUMBER:

33884.FL

BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

00111110			2011 11	IENT . BESOUT S/N 1517, Hud totally, Fig tools, Five cast	i ig		ORIENTATION : Vertical
WATER	LEVELS: 5.8	88 ft b	gs on 9		24/20	D7 LOGGER : P. De Sa'rego, J. Tow	nes, R. Bitely, M. Faurote, C. Sump
≥0≥	(%)			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A B B A C A C A C A C A C A C A C A C A	E F	(%) O	TUR 00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	]   	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
THE N	SNE	Ø	SAC ER F	PLANARITY, INFILLING MATERIAL AND	/MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	0 H E	œ	H H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	,,
-197.6			_1_	240.1' - Fracture, 60 deg, rough, undulating	Н	Limestone - 239.0-240.2' - yellowish gray, (5Y	_
					ш	7/2), very fine grained, mild HCl	
	R9-HQ				Ш	reaction, weak (R2), voids up to	
	5 ft 24%	0		-	Н	<ul> <li>3/32" over 30% of surface, fossil molds, poorly fossiliferous, trace</li> </ul>	
			NR	-	H	laminations	<u> </u>
-				-	Н	- No Recovery 240.2-244.0'	-
=				-	ш	-	R9:7 minutes
_	0.4.0			-	ш	-	-
-	244.0		>10	244.0-244.5' - Fracture zone, multiple high	╂┼	Limestone	Driller's Remark: Smooth
			/10	angle intersecting fractures, rock fragments	H	<ul> <li>244.0-244.5' - yellowish gray, (5Y</li> </ul>	drilling, no loss of
245_ -202.6				up to 1-3/16"	Ш	7/2), very fine to fine grained, moderate to strong HCl reaction,	resistance or rod drops; incompetent material being
				-	Н	<ul> <li>very weak to weak (R1 to R2), voids</li> </ul>	ground up and washed out -
_	D40 110			-	ш	<1/16" over 50% of surface, trace laminations, area of oxidized pyrite	-
_	R10-HQ 5 ft	0		-	Н	- 3/4", poorly fossiliferous	-
_	10%		NR	<u>-</u>	H	No Recovery 244.5-249.0'	-
				_	Ħ	_	_
					Н	_	_
					Ш		R10:7 minutes
	249.0				Ш		
			>10	249.0-249.6' - Fracture zone, multiple high	Н	Limestone	l -
250				angle intersecting fractures, rock fragments to 1-3/16"	П	<ul> <li>249.0-249.6' - yellowish gray, (5Y 7/2), very fine to fine grained,</li> </ul>	<u> </u>
-207.6				_	H	moderate HCl reaction, extremely	_
_				-	Н	<ul> <li>weak to very weak (R0 to R1), trace laminations, nonfossiliferous</li> </ul>	-
_	R11-HQ			-	ш	No Recovery 249.6-254.0'	-
-	5 ft 12%	0	NR	-	ш	-	-
_	1270		1414	-	Н	_	-
-				-	Ħ	-	-
-				-	H	-	R11: 7 minutes
-				-	╀┤	-	-
-	254.0			254.0-255.0' - Fracture zone, rough,	П	_ Limestone	-
-			>10	undulating, multiple high angle intersecting	団	<ul> <li>254.0-256.5' - yellowish gray, (5Y</li> </ul>	-
255_ -212.6			2	fractures, rock fragments up to 1.5"	$\vdash \vdash$	7/2), very fine to fine grained, moderate HCl reaction, very weak to	_
				255.2' - Fractures (2), 60 deg and horizontal,	F	<ul> <li>weak (R1 to R2), trace laminations,</li> </ul>	-
-	D40.110			rough, undulating, 3/16" open	H	cavities up to 3/8" over 5% of surface, fossil molds, poorly	_
-	R12-HQ 5 ft	0			Н	- fossiliferous	-
-	28%		, _		Щ	No Recovery 256.5-259.0'	-
			NR	-	Ш	<u>-</u>	_
					H	_	
1 _					$\Box$	_	R12: 7 minutes
	259.0			_	H	_	_
			>10	_	Н	_	_
260			- 10		$\square$		



338884.FL AD-03

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ORIENTATION: Vertical

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 8/16/2007 END: 8/24/2007 LOGGER: P. De Sa'rego, J. Townes, R. Bitely, M. Faurote, C. Sump DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 90 DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS -217.6 259.0-259.3' - Fracture zone, rough, Limestone undulating, multiple intersecting fractures, 259.0-260.1' - yellowish gray, (5Y 7/2), very fine to fine grained, fragments up to 0.5" with one larger piece moderate to strong HCI reaction, R13-HQ weak (R2), voids <1/16" over 60% of 259.4' - Fracture, <10 deg, rough, undulating, 0 5 ft 259.7' - Flacture, 10 dag, 10 surface, cavities up to 3/4" over 10% 22% NR surface, fossil molds, moderately fossiliferous No Recovery 260.1-264.0' R13: 7 minutes horizontal, rough, undulating, intersecting fractures, ~3/8" open, due to fossil molds 264 0 259.95-260.1' - Fracture zone, fragments up Limestone 264.0-264.5' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, weak to strong to 1" >10 264.0-264.35' - Fracture zone, rough, 265 undulating, fragments up to 2' -222 6 >10 264.45, 265.8, 265.95' - Bedding plane or (R2 to R4), voids <1/16" over 10% mechanical break (3), <10 deg, smooth to surface, few small dissolution rough, planar to undulating cavities (<1x1/2"), trace shell laminae R14-HQ (<1/2"), poorly to moderately 5 ft 0 22% fossiliferous NR Interbedded Silt And Limestone 264.5-264.7' - yellowish gray, (5Y 7/2), dry to moist, nonplastic to low plasticity, moderate to strong HCI R14: 6 minutes reaction, coarse angular fragments, <50% limestone fragments, all 269.0 10 carbonate 269.0-269.3' - Bedding plane, <10 deg and 80 deg, smooth to rough, undulating to Limestone 264.7-264.95' - Same as planar, intersecting fractures 270 264.0-264.5 -227.6 Interbedded Silt And Limestone 264.95-265.1' - Same as 264.5-264.7 R15-HQ No Recovery 265.1-269.0' 0 5 ft NR Limestone 6% 269.0-269.3' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, medium strong to strong (R3 to R4)
No Recovery 269.3-274.0' R15: 6 minutes 274.0 274.0-274.4' - Fracture zone, rough, Limestone 274.0-275.0' - yellowish gray, (5Y 7/2), very fine to medium grained, >10 undulating, coarse fragments <1.5" 275 274.6' - Bedding plane or mechanical break, -232.6 or fracture, <10 deg, rough to smooth, mild HCl reaction, weak to strong (R2 to R4), voids <1/16" over 10% of undulating surface, moderately fossiliferous with fossil cast lenses R16-HQ No Recovery 275.0-279.0' 5 ft 20% 0 NR R16: 6 minutes 279.0 279.0-280.7' - Fracture, <10 deg, rough, >10 fragments <2", intersecting horizontal and 280 vertical fragments



PROJECT NUMBER: BORING NUMBER: 338884.FL AD-03

ROCK CORE LOG

SHEET 5 OF 16

ORIENTATION : Vertical

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

WATER	LEVELS : 5.8	88 ft b	gs on 9	9/13/07 START: 8/16/2007 END: 8/	24/20	07 LOGGER : P. De Sa'rego, J. Tov	vnes, R. Bitely, M. Faurote, C. Sump
≥∩ ∷	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
ELOV N (#	N AND 3Y (%		ZES T	DESCRIPTION	C LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-237.6					ш	Limestone	
_			>10	-	ш	<ul> <li>279.0-280.7' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl</li> </ul>	-
	R17-HQ 5 ft	0			Ш	reaction, medium strong to strong (R3 to R4)	
_	34%	U		_	Ш	No Recovery 280.7-284.0'	
_			NR	-	Н	<del>-</del>	_
_				<u>-</u>	Ы	-	R17: 10 minutes
-				-	$\vdash$	_	R17. 10 Illilliules
-	284.0			284.0-284.55' - Fracture zone, rough,	H	_ Limestone	-
			>10	undulating, multiple intersecting fractures	Ħ	<ul> <li>284.0-284.9' - yellowish gray, (5Y</li> </ul>	-
285_ -242.6				284.8' - Bedding plane, 10 deg, rough, — undulating	Ħ	7/2), very fine to fine grained, medium strong to strong (R3 to R4),	_
-			>10	285.15' - Fracture, <10 deg, rough,	Ħ	<ul> <li>&lt;1/16" voids over 10% of surface, fossiliferous</li> </ul>	
-	R18-HQ			undulating, intersecting fractures 285.2' - Fracture, 55 deg, rough, undulating,	Ħ	284.9-285.4' - grayish orange pink to - yellowish brown, (10YR 6/2 to 10YR	1
	5 ft 62%	12	>10	intersecting fractures 285.25' - Fracture, <10 deg, rough,		5/4), fine to medium grained,	]
_				undulating, intersecting fractures	Ħ	moderate HCl reaction, extremely weak to weak (R0 to R2)	
_			NR	285.75' - Fracture or mechanical break, <10 deg, rough, undulating	H	285.4-285.5' - fine to medium grained, moderate HCl reaction	
_			' ' '	286.4' - Fracture or mechanical break, <10 deg, rough, undulating	Ш	<ul> <li>285.5-287.1' - yellowish gray, (5Y</li> </ul>	R18: 6 minutes
-	289.0			286.6-287.1' - Fracture or mechanical break,	H	7/2), fine to medium grained, mild HCl reaction, very weak to weak (R1	-
-			>10	40 deg, rough, undulating, multiple intersecting fractures	Н	<ul> <li>to R2), voids &lt;1/16" over 20% of surface, trace fossil casts</li> </ul>	-
290_ -247.6			>10	286.61' - Fracture or mechanical break, <10 deg, rough, undulating	H	No Recovery 287.1-289.0'	_
-	-			289.0-290.5' - Fracture zone, rough, undulating, multiple intersecting fractures,	F	Limestone 289.0-290.5' - yellowish gray, (5Y	-
-	R19-HQ			rock fragments <4"x1"	F	7/2), very fine to medium grained, mild HCl reaction, extremely weak to	=
_	5 ft 30%	0		290.4' - Fracture, rough, undulating, potential healed fractures, intersecting	Н	medium strong (R0 to R3), voids	-
			NR		Ħ	over 15 to 30% of surface (<1/16"), poorly to moderately fossiliferous	
_				_	Щ	No Récovery 290.5-294.0'	
_				-	H	-	R19: 5 minutes
-	294.0			-	囯	_ Limestone	
-			>10	294.3' - Fracture, 70 deg, rough, undulating	団	<ul> <li>294.0-295.9' - yellowish gray, (5Y</li> </ul>	rotation to approx. 400 rpm -
295_ -252.6				294.6' - Fracture, 70 deg, rough, undulating — 294.6-295.0' - Fractures, multiple intersecting	丗	8/1), very fine to fine grained, extremely weak to weak (R0 to R2),	to achieve better recovery in softer material
_			3	fractures, fragments <2" 295.2' - Bedding plane or mechanical break,	$\blacksquare$	<ul> <li>laminated bedding, &lt;5% voids (1/16") over surface, trace secondary</li> </ul>	M. Faurote continues – logging
-	R20-HQ		10	<10 deg, smooth to rough, undulating 295.3' - Fracture or mechanical break, 60	Ш	infill on clast inclusion	
_	5 ft 38%	10		deg, rough, undulating	Ы	- No Recovery 295.9-299.0'	1
	]			295.8-295.9' - Fracture zone, rough, undulating, >3 fractures intersect	$\mathbb{H}$	_	]
_			NR		F	_	
_					Ħ	<u>-</u>	R20: 5 minutes
-	299.0			<u>-</u>	H	- -	
-			3	299.35' - Mechanical break or bedding plane,	H	_	-
300				<10 deg, smooth to rough	H	_	_
l	1		1 1		1		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

AD-03 SHEET 6 OF 16

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

WATER	LEVELS : 5.8	88 ft b	gs on s	9/13/07 START : 8/16/2007 END : 8/	24/20	D7 LOGGER : P. De Sa'rego, J. Tow	nes, R. Bitely, M. Faurote, C. Sump
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-257.6 - -			>10	299.45' - Mechanical break or bedding plane, <10 deg, smooth to rough, slickensided 299.7' - Mechanical break or bedding plane, <10 deg, smooth to rough, slickensided		Limestone  - 299.0-299.3' - grayish orange, (10YR 7/4), very fine grained, mild HCl reaction, extremely weak (R0), trace	-
-	R21-HQ 5 ft 82%	51	>10	300.4-300.65' - Fracture zone, rough, undulating, gravel sized fragments <2" 301.0-301.1' - Fracture zone, rough,		<ul> <li>laminations</li> <li>299.3-299.35' - olive gray, (5Y 4/1),</li> <li>very fine grained, no HCl reaction,</li> </ul>	SC-1 collected at 302.0-
-			1 0 NR	undulating, sand sized fragments 301.5' - Fracture or mechanical break, <10 deg, smooth to rough, undulating 301.9-302.1' - Fracture, <10 deg, smooth to		<ul> <li>extremely weak (R0)</li> <li>299.35-301.0' - yellowish gray to light</li> <li>olive gray, (5Y 8/1 to 5Y 6/1), very</li> <li>fine to medium grained, moderate</li> </ul>	302.8'
305	304.0		>10	rough, undulating, gravel sized fragments <1" 302.85' - Fracture or mechanical break, <10 deg, rough, undulating 304.0-305.9' - Fracture zone, rough,		HCl reaction, extremely weak to very weak (R0 to R1), laminated bedding 301.0-303.1' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to	-
-262.6 -	R22-HQ		>10	undulating, gravel sized fragments <2"		moderate HCl reaction, laminated bedding, voids <1/16" over 10% of surface No Recovery 303.1-304.0'	- - -
- - -	5 ft 38%	0	NR	- - - -		Limestone 304.0-305.9' - yellowish gray, (5Y 8/1), mottled colorations with trace organics, very fine grained, moderate HCI reaction, medium strong to strong (R3 to R4), trace voids <1/16", poorly fossiliferous	- - - R22: 7 minutes
	309.0				」	No Recovery 305.9-309.0'	_
310 -267.6			>10	309.0-309.7' - Fracture zone, rough, undulating, gravel sized fragments <2" -		Limestone  309.0-312.8' - yellowish gray, (5Y 7/2), very fine to fine grained,	- -
-207.0	R23-HQ		>10	310.25-310.35' - Fracture zone, rough, undulating, gravel sized fragments <1" 310.8, 311.15, 311.55, 311.95, 312.1' -		moderate HCl reaction, extremely - weak to weak (R0 to R2) 309.0-310.8' - very fine grained, mottled laminations	-
_	5 ft 76%	33	3 >10	Bedding plane (5), <10 deg, rough, undulating - 312.3-312.8' - Fracture zone, rough, -		<ul> <li>310.8-312.8' - very fine to fine grained, laminated bedding, with voids (&lt;1/16") over 30% of surface</li> </ul>	- - -
-	314.0		NR	undulating, gravel sized fragments <1"		- No Recovery 312.8-314.0' -	R23: 5 minutes
315_ -272 6	014.0		>10	314.0-315.6' - Fracture zone, rough, undulating, gravel sized fragments <3" -		Limestone  314.0-315.6' - yellowish gray, (5Y  8/1), very fine to medium grained, moderate HCl reaction, extremely	- -
-	R24-HQ 5 ft	0	>10	- -		weak to weak (R0 to R2), voids <1/16" over 10% of surface No Recovery 315.6-319.0"	- - -
-	32%		NR			-	
-	319.0			318.0-320.0' - Fracture zone, rough, undulating, gravel sized fragments <2" -		- -	R24: 5 minutes -
320			>10				

ORIENTATION: Vertical



PROJECT NUMBER:

33884.FL BORING NUMBER:

AD-03 SHEET 7 OF 16

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING	I WE I HOD AI	ND EC	JUIPIV	IENT: BL3001 S/N 1517, mud rotary, HQ tools, HW cas	irig		ORIENTATION : Vertical
WATER	LEVELS: 5.8	8 ft b	gs on 9	9/13/07 START: 8/16/2007 END: 8.	24/20	D7 LOGGER : P. De Sa'rego, J. Tov	vnes, R. Bitely, M. Faurote, C. Sump
≥∩ ⊙	(9)			DISCONTINUITIES	ပ္	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A B B B B B B B B B B B B B B B B B B B	B.F.A	(%) O	TUR 00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	٦ ا	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FFF	SNE	ØΒ	SAC ER F	PLANARITY, INFILLING MATERIAL AND	/MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	0 H E	œ	H H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	,, -
-277.6 _			4	320.1' - Fracture, 30 deg, rough, undulating,	$\vdash$	<b>Limestone</b> - 319.0-320.5' - yellowish gray, (5Y	_
				4 intersecting fractures 320.3' - Fracture, 70 deg, rough, undulating,	$\perp$	8/1), very fine to medium grained,	_
l _	R25-HQ 5 ft	0		4 intersecting fractures	工	mild to moderate HCl reaction, very weak to weak (R1 to R2)	_
	30%	U			$\vdash$	No Recovery 320.5-324.0'	
			NR		H		I -
-						-	1
-					╁	-	R25: 6 minutes
-	324.0				仜	-	
-	324.0			324.0-326.1' - soil interval	111	Silty Sand (SM)	Begin drilling at 8:00 on – 8/22/07; water level at 3'
205			NA		1111	- 324.0-326.1' - yellowish gray, (5Y	below ground surface
325_ -282.6				_	1	7/2), moist, dense, fine to coarse grained, mild HCl reaction, 40 to 60%	Driller's Remark: No — slough in boring, clean to
-			NA		-	<ul> <li>carbonate sands, 40 to 60% low</li> </ul>	324' below ground surface
_	R26-HQ				-	plasticity carbonate silts	Driller's Remark: Moderate –
-	5 ft	0			-	No Recovery 326.1-329.0'	to slow advancement rate; very consistent
_	42%				4)	_	advancement _
-			NR		4111	_	Driller's Remark: Slow rotation rate to approx. 300
_					1111	<del>-</del>	rpm to achieve better
_						_	recovery in softer material R26: 7 minutes
1 -	329.0						1020. 7 minutes
l _			NA		4	<b>Sandy Silt (ML)</b> - 329.0-331.3' - yellowish gray, (5Y	_
330_			1471	_	1111	7/2), dry to moist, very dense, fine to	
-287.6			NA			coarse grained, >50% low plasticity - carbonate silts, carbonate sands	
			INA			carbonate sins, carbonate sands	
	R27-HQ 5 ft	40	NA		Ш	- Limestone	-
	88%	40	2	331.5' - Mechanical break, boxing core		331.3-333.4' - yellowish gray, (5Y	
-				331.7' - Bedding plane or mechanical break, <10 deg, rough, undulating	╁	7/2), very fine to fine grained,	1
_			2	331.85' - Bedding plane or mechanical break,	$\vdash$	<ul> <li>moderate HCl reaction, extremely weak to very weak (R0 to R1), trace</li> </ul>	
-			0	<10 deg, rough, undulating 332.5' - Fracture or mechanical break, 60	仜	organic laminations	R27: 6 minutes
-	334.0		NR	deg, rough, undulating	╁	No Recovery 333.4-334.0'	
-	JUT.U			332.9' - Bedding plane or mechanical break, <10 deg, rough, undulating	F	No Recovery 334.0339.0'	Driller's Remark: Possible
335				10 dog, rodgii, diiddidiiig	Ħ	-	void space; low torque on - drill indicating very soft
-292.6				_	╁	<del> </del>	material or no material; no
-					H	-	fluid return; fluid return at
-	R28-HQ				口	-	higher flow rate of approx.  25 gpm and not drilling
-	5 ft	0	NR		+	-	(approx. 25% circulation) -
-	0%				F	_	-
-					Ë	_	-
_					╀	-	R28: 7 minutes
-						-	rzo. / Illinutes
-	339.0				上	- N. B	_
_					╁┯	No Recovery 339.0-342.0'	
340							
							<u> </u>



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING	METHOD A	ND E	QUIPM	IENT : BL300T S/N 1517, mud rotary, HQ tools, HW casi	ng		ORIENTATION : Vertical
WATER	LEVELS : 5.8	88 ft b	gs on s	9/13/07 START: 8/16/2007 END: 8/2	24/20	07 LOGGER : P. De Sa'rego, J. Tow	nes, R. Bitely, M. Faurote, C. Sump
>00	6)			DISCONTINUITIES	9	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-297.6 - - - - -	R29-HQ 5 ft 34%	0	NR NA NA	342.0-343.7' - Fracture zone, rough, undulating, trace staining, silt material, fractures in rock fragments		Sandy Silt (ML)  342.0-343.4' - yellowish gray, (5Y 7/2), moist to wet, soft to stiff, fine to coarse grained, moderate HCl reaction	Driller's Remark: Clogging in core barrel; tag total - depth at 341' below ground surface with cutting bit pulled; core barrel is open, but rock fragments may be rolling under the bit causing no recovery or possible void; felt rock fragment break loose or move out of the way; 2' of
- 345 -302.6 - - -	344.0 R30-HQ 5 ft 74%	32	NR 7 >10 3 2	344.3-344.4' - Fracture zone, vertical and horizontal, multiple fractures on and through the zone, broken fragments  345.5-345.75' - Fracture zone, fragments 1/4" to 3/4", in transition between lithologic units 346.1' - Mechanical break  346.95' - Mechanical break or bedding plane 347.3' - Bedding plane, horizontal, smooth,		343.4-343.7' - bluish gray, yellowish gray, (5B 7/1, 5Y 7/2), moderate HCl reaction, weak (R2) No Recovery 343.7-344.0' Silt (ML) 344.0-344.3' - brown to orange gray, carbonate grains Limestone 344.3-345.7' - very fine to coarse grained, strong HCl reaction, very weak (R1), bedded at 345.7' >345.7-347.4' - light gray, (N8), very	recovery from 342 to 344' R29: 6 minutes
- - - 350 -307.6	349.0		NR >10	planar, organic, trace iron oxide 347.4' - Bedding plane, horizontal, smooth, planar, organic, trace iron oxide  -  349.5' - Fracture, 65 deg, planar to undulating		fine grained, strong HCl reaction, medium strong (R3), pyrite mottling  Silt (ML) 347.4-347.7' - compact, carbonate No Recovery 347.7-349.0'  Limestone 349.0-350.5' - light gray to white, (N8	R30: 7 minutes
- - - - -	R31-HQ 5 ft 98% 354.0	56	>10 3 2	349.6-350.4' - Fracture zone, heavily fractured, fragmented 350.7-351.1' - Bedding plane, horizontal, planar, silt to sand horizon between weak rock 351.7' - Mechanical break, 0-10 deg, rough, undulating to planar 352.0' - Mechanical break, 0-10 deg, rough, undulating to planar 352.6' - Mechanical break, 0-10 deg, rough, undulating to planar 353.05' - Mechanical break, 0-10 deg, rough, undulating to planar 353.05' - Mechanical break, 0-10 deg, rough,		to N9), very fine grained, strong HCI reaction, medium strong (R3)  350.5-352.0' - yellowish gray, (5Y 8/1), very fine grained, strong HCI reaction, very weak (R1), laminated bedding, trace organics, trace pyrite 352.0-354.0' - white, light gray, yellowish gray, (N9, N8, 5Y 8/1), very fine grained, strong HCI reaction, weak (R2), trace iron, pyrite	R31: 6 minutes
355_ -312.6 - - - - - -	R32-HQ 5 ft 100%	24	0 NA >10 >10	undulating to planar 353.55' - Mechanical break, 0-10 deg, rough, undulating to planar 354.4' - Bedding plane, horizontal, smooth, undulating, light to moderate organic 354.6' - Bedding plane, horizontal, smooth, undulating, light to moderate organic staining 354.8-356.4' - Fracture zone, 0-80 deg, organic staining, fragments 1/4" x 1/2" 357.0-357.5' - Fracture zone, 0-75 deg, multiple fragments 1/2" x 1/2" 357.5-358.3' - Fracture zone or bedding plane, 0-60 deg, random fractures, multiple sizes		Sandy Silt (ML)  354.0-354.4' - pinkish gray, (5YR 8/1), carbonate derived, friable  Limestone 354.4-354.8' - pale orange, (10YR 8/2), strong HCl reaction, weak (R2),  <10% voids <1/16"  Silt (ML) 354.8-356.0'  Limestone 356.0-358.2' - pale orange, (10YR 8/2), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), 15-18% voids <1/8"	R32: 8 minutes
360	359.0		2	358.4' - Fractures, 75 deg and 60 deg, smooth, intersecting 359.4' - Bedding plane, rough, undulating		-	_ _



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SHEET 9 OF 16

ORIENTATION: Vertical

#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 8/16/2007 END: 8/24/2007 LOGGER: P. De Sa'rego, J. Townes, R. Bitely, M. Faurote, C. Sump DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS -317.6 359.95' - Bedding plane, rough, undulating Limestone 360.2-360.4' - interbedded, generally >10 358.2-361.1' - pale orange, (10YR 8/2), very fine grained, weak to horizontal medium strong (R2 to R3), 20% voids (<1/16"), fossiliferous 361.1-361.3' - very fine grained, 360.95' - Mechanical break R33-HQ 50 3 5 ft 361.5' - Fracture or bedding plane, horizontal 82% SC-2 collected at 361.75and vertical, rough, undulating 361.6' - Fracture or bedding plane, horizontal transition zone, irregular, convoluted surface, laminar, horizontal bedding, 362 65' >10 and vertical, rough, undulating 361.7' - Fracture or bedding plane, horizontal organic interbedding, rip-up clasts 361.3-363.1' - yellowish gray, (5Y 8/1), trace mottling, very fine to R33: 6 minutes and vertical, rough, undulating NR 362.7-363.1' - Fracture zone, smooth to medium grained, moderate to strong 364 0 rough, undulating, multiple fragments, no HCI reaction, weak (R2), fossil casts visible orientations (1/16 to 3/8") over 10 to 15% of the 7 364.25-364.45' - Bedding plane, smooth, surface, faint bedding 365 undulating No Recovery 363.1-364.0' -322 6 364.7' - Fracture, 85 deg and vertical, rough, Limestone 0 undulating 364.0-364.25' - pale orange, (10YR 364.9' - Bedding plane, horizontal, smooth, 8/2), trace mottling, very fine grained, moderate to strong HCI reaction, R34-HQ contact, with 45 deg fracture 2 5 ft 52 366.2' - Bedding plane, rough, contact very weak (R2), fossil casts (1/16 to 3/8") over 10 to 15% of the surface, faint 100% irregular 366.9-368.0' - Fracture zone, smooth, bedding >10 undulating, irregular contact with uneven 364.25-364.9' - pale orange, (10YR surfaces 8/2), very fine grained, strong HCI R34: 6 minutes reaction, medium strong (R3), 1 granular, voids (<1/16") over 15% of 369.0 368.7' - Bedding plane, horizontal surface, cavities (up to 1/2 to 1/4") over 10% of surface (fossil molds) >10 369.35-369.8' - Fracture zone or bedding 364.9-366.15' - grayish orange, 370 plane, 0-90 deg, smooth to rough, planar to (10YR 7/4), very fine grained, strong undulating, iron oxides and trace organics 327.6 to very strong HCI reaction, medium >10 370.1' - Fractures, horizontal and 8 deg, strong (R3), trace organics as laminae at top of interval rough, undulating R35-HQ 370.6-370.7' - Fracture zone 366.15-368.2' - white, pale orange, (N9, 10YR 8/2), very fine grained, medium strong to strong (R3 to R4), 44 1 5 ft 371.5' - Mechanical break 74% 371.9' - Mechanical break 20% burrows, molds, and 5% voids 1 (<1/16"), trace organics 372.6' - Mechanical break 368.2-368.6' - pale orange, (10YR R35: 5 minutes 8/2), very fine grained, very weak to weak (R1 to R2), granular, 1/8" NR 374.0 organic layer at 368.3', few voids, few 374.0-374.3' - Fracture zone, fragments 1/4" cavities >10 to 3/4" Limestone 375 374.3' - Bedding plane, horizontal and 5 deg, 369.4-370.5' - white to pale orange, -332.6smooth, undulating (N9 to 10YR 8/2), very fine grained, 374.4' - Bedding plane, horizontal and 5 deg, >10 strong HCl reaction, medium strong smooth, undulating (R3), trace organics, burrows and 374.6' - Bedding plane, horizontal and 5 deg, R36-HC molds create cavities to 1/2", 10% smooth, undulating 374.85' - Fracture, 20 deg, rough, undulating 374.9-375.3' - Fracture zone, multiple orientations, fragments are 1/2"x1" to 2"x1" voids (<1/16") 5 ft 12 >10 66% 370.5-372.7' - yellowish gray, (5Y 7/2), very fine grained, strong HCI reaction, medium strong to strong 375.55' - Mechanical break 375.7-375.95' - Fracture zone (R3 to R4), 20 to 25 % voids (<1/16") NR R36: 7 minutes and fossil molds and casts 376.55' - Fracture zone, horizontal and 25 No Recovery 372.7-374.0' deg, rough, undulating 379.0 376.6-376.8' - Fracture zone, trace iron oxide 2 380



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#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 8/16/2007 END: 8/24/2007 LOGGER: P. De Sa'rego, J. Townes, R. Bitely, M. Faurote, C. Sump LITHOLOGY DISCONTINUITIES COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -337.6 Limestone 380.1, 380.2, 380.45' - Bedding plane (3), 5 374.0-374.45' - grayish orange, horizontal (10YR 7/4), fine to medium grained, 380.8, 380.9' - Mechanical break (2) moderate HCl reaction, very weak R37-HQ 381.05' - stepped fracture over 3/4", angular (R1), laminated bedding, organic 18 4 381.4' - Bedding plane, smooth, undulating, 5 ft interbedding 374.45-377.3' - yellowish gray, (5Y 82% stepped 381.7, 381.9, 382.15, 382.6' - Bedding plane 8/2), very fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), 25 to 35 % burrows, cavities (molds), 5 to 10% voids (<1/16"), leastly because the strength of the strength 4 (4), smooth, undulating 382.7, 382.9' - Bedding plane (2), rough, R37: 6 minutes undulating NR locally heavily fractured 384 0 No Recovery 377.3-379.0' 384.2, 384.4, 384.5, 384.7' - Bedding plane Limestone 8 or mechanical break (4) 379.0-381.75' - grayish orange, 385 (10YR 7/4), very fine to fine grained, strong HCl reaction, very weak to 384.9' - mid point of vertical fracture along -342 6 center of core 6 385.05, 385.2, 385.7, 385.9' - rough, multiple weak (R1 to R2), nonreactive granular material, localized laminated fragments, angular to spike random angles R38-HQ 386.0' - Fracture, 20 deg bedding with trace organics 5 ft 39 >10 386.6-387.5' - Fracture zone, multiple 381.0-381.3' - extremely weak (R0), 96% friable, dissembles in water fragments up to 2", crosses lithology change 381.75-383.1' - yellowish gray, (5Y >10 8/1), very fine grained, strong HCI 387.8' - Bedding plane, 10 deg, smooth, SC-3 collected at 387.8reaction, medium strong (R3), 10% undulating 388.8' voids (<1/8") 382.7-383.1' - very weak to weak (R1 0 R38: 7 minutes 389.0 NR to R2) 389.05' - Mechanical break No Recovery 383.1-384.0' 4 389.4-389.5' - Bedding plane, horizontal and Limestone 390 5 deg, smooth, undulating, silt/clay infill 384.0-384.5' - yellowish gray, (5Y 347.6 7/2), very fine grained, very strong 2 HCI reaction, extremely weak (R0) 390.5-391.5' - Fracture zone, fragments to 2", 384.5-387.0' - grayish orange, (10YR subangular to angular, 40-60% infill <1" R39-HQ 7/4), very fine grained, strong HCl reaction, medium strong (R3), 20% 27 2 391.5-391.8' - Bedding plane, horizontal, 94% smooth, undulating, rock partings on both <1/16" voids, trace organics, cavities to 3/4" ends 1 387.0-388.8' - light gray, light blue gray, (N7, 5B 7/1), very fine to fine 391.8-392.6' - Fracture zone, fragments to 1-1/2", subangular to angular R39: 8 minutes grained, strong HCl reaction, weak to 392.9' - Bedding plane, smooth, undulating, >10 contact rock with silt/sand medium strong (R2 to R3), 25% NR 394.0 393.4-393.7' - Fracture zone, fine infill, fossil casts (1/16 to 9/16" max.) of angular fragments to 1" forams, pelecypods, and >10 394.0-394.55' - Fracture zone, fractures from echinoderms 395 horizontal to vertical, immediately below 3/8" No Recovery 388.8-389.0' -352.6 gravel sized fragments, clay/silt rock Limestone >10 389.0-393.7' - grayish orange, very pale orange (392.0'), (10YR 7/4, 10YR 8/2), strong HCl reaction, fragments to end of run R40-HQ 5 ft 36% 0 extremely weak to very weak (R0 to R1), fracture zone, breccia begins at 390.5', 15-18% voids (<1/16") in rock NR fragments No Recovery 393.7-394.0' R40: 6 minutes Limestone 394.0-395.8' - Same as 389.0-393.7' 399.0 395.6' - becomes tacky, heavy silt 1 No Recovery 395.8-399.0' 400 399.65' - Bedding plane, smooth, horizontal



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ORIENTATION: Vertical

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 8/16/2007 END: 8/24/2007 LOGGER: P. De Sa'rego, J. Townes, R. Bitely, M. Faurote, C. Sump DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS -357.6 400.0' - Fracture, horizontal, rough, Limestone 2 undulating 399.0-399.25' - very pale orange, (10YR 8/2), moderate HCl reaction, 400.1' - Fracture, vertical, rough, undulating 401.0' - Mechanical break very weak (R1), 30% voids (<1/8") R41-HQ (fossil molds), sand-sized grains, 67 1 5 ft SC-4 collected at 401.5fossil fragments 399.25-403.4' - yellowish gray, (5Y 8/1), mild to strong HCl reaction, 88% 402.65 1 weak (R2), trace iron oxides on shell 402.7' - Fracture, 45 deg, planar casts, 15% <1/16" voids with 1 R41: 6 minutes sporadic fossil casts to 1/4" NR No Recovery 403.4-404.0' 404 0 Limestone 404.1' - Bedding plane, 5 deg, undulating 404.0-408.95' - grayish orange pink, (5YR 7/2), fine to medium grained, 2 405 404.85' - Fracture, 15 deg, smooth, planar 405.05' - Bedding plane or mechanical break, moderate HCI reaction, very weak -362.6 1 (R1). HCl reaction delayed core contacts spun against each other brecciated at 410.2-410.35 R42-HQ 5 ft 86 1 99% 406.65' - Bedding plane, horizontal and 5 deg, smooth, undulating 2 407.05' - Bedding plane, 10 deg, smooth, planar 407.75' - Mechanical break R42: 6 minutes 1 409.0 408.85' - Mechanical break, probably when NR No Recovery 408.95-409.0' breaking core run off bottom Limestone >10 409.0-411.3' - Same as 410 409.7-410.0' - Mechanical break, undulating, -367.6 404.0-408.95' heavily fractured near vertical planes, >10 probably mechanically induced 410.3' - Fracture, 40 deg and 45 deg, zone R43-HQ infilled with 1/8" or less rock fragments in silt 14 >10 Limestone 5 ft matrix 411.3-412.0' - mild HCl reaction, very 60% 410.6-412.0' - Fracture zone, horizontal and vertical, multiple fragments of varying size weak (R1), dark organic laminae, ranging to 3"x1-1/2"x1", organic (coatings) on trace iron oxides on bedding plane planar surfaces and lining casts from NR 411.3-412 No Recovery 412.0-414.0' R43: 7 minutes 414.0 Limestone 414.15' - Bedding plane, horizontal, smooth, 414.0-414.6' - very pale orange, 5 planar (10YR 5/2), very fine grained, very 415 414.4' - Fracture, vertical and 60 deg -372.6 strong HCl reaction, weak (R2), 5% 414.6' - Bedding plane, rough, undulating (<1/16") voids on surface, trace 3 414.95, 415.2, 415.5, 415.8' - Mechanical òrganics break (4) R44-HC Conglomerate 2 57 414.6-414.8' - strong HCl reaction, 5 ft 416.4' - Mechanical break, horizontal 89% variegated, silica gravel up to 3/8", 416.8' - Fracture, 65 deg, planar to limestone grains undulating, 1/16" separation 2 Limestone 417.15, 417.25' - Fracture (2), horizontal and 414.8-418.45' - very pale orange, 80 deg, 1/16" to 1/16" separation R44: 8 minutes 1 (10YR 8/2), very fine grained, strong 418.4' - Bedding plane, smooth, undulating HCl reaction, weak to medium strong NR 419.0 (R2 to R3), 5 to 20% (<1/16") voids, fossil molds, some including cavities 419.2' - Bedding plane, probable organic 1 up to 1/2", trace organic material stain and/or infill 420 No Recovery 418.45-419.0'



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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 8/16/2007 END: 8/24/2007 LOGGER: P. De Sa'rego, J. Townes, R. Bitely, M. Faurote, C. Sump DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -377.6 419.75' - Mechanical break Peat 1 419.0-419.2' - brownish black, (5YR 2/1), malleable R45-H0 Limestone 421.3' - Fracture, vertical, smooth, undulating 65 2 419.2-421.8' - very pale orange, 5 ft 96% (10YR 8/2), very fine grained, strong 421.7-422.5' - Bedding plane or fracture zone, rough, undulating, irregular contact with HCl reaction, medium strong (R3), >10 uneven surfaces fossil mold rich, 25% (<1/16") voids, trace organics 421.8-423.8' - very pale orange to R45: 9 minutes 423.1' - Mechanical break >10 pale yellowish brown, (10YR 8/2 to 423.4-423.8' - Fracture zone, horizontal and 10YR 6/2), very fine grained, moderate to strong HCl reaction, 424 0 NR vertical, rough, undulating, may be extensively broken from/by breaking core for medium strong to weak (R3 to R2), voids (<1/16") over 10-15% of 1 retrieval 425 424.9' - Mechanical break -382 6 surface, 3-8% cavities (1" x 1/4") 2 425.4' - Fracture, rough, undulating, angular 425.6' - Bedding plane, 5 deg and 15 deg, weak (R2) rock (last 1' of interval), trace organics, laminar interbeds with fossil coatings R46-HQ undulating, organic infilling No Recovery 423.8-424.0' 5 ft 86 4 426.45' - Bedding plane or mechanical break 426.5' - Mechanical break, 10 deg and 100% Limestone 424.0-428.3' - Same as 421.8-423.8' vertical, undulating, short 426.7' - Bedding plane, trace organic 2 staining, open to 1" R46: 8 minutes 427.3' - Bedding plane, rough, undulating, 428.3-433.3' - very pale orange, 3 open channel interface Driller's Remark: Lost (10YR 8/2), very fine grained, 429.0 427.6' - Fracture, rough, undulating, 1/16" circulation at 428.2-429.3' moderate to strong HCI reaction, 3 very weak (R1), voids (1/16"-1/8") 428.05, 428.2, 428.7' - Bedding plane (3), over <10% of surface, 1/16"-3/16" 430 organic infill, stains 387.6 fossil casts, at 428.3-429.0' vertical 429.2, 429.45, 429.8, 430.1' - Bedding plane channel-like voids (1/2"-1-1/2" wide) 3 (4), smooth, planar to undulating SC-5 collected at 430.5-430.2' - Fracture, organic or iron oxide 431.55' R47-HQ healed, 1/16" 50 1 5 ft 430.35, 430.5, 431.55, 434.55, 434.7' -98% Bedding plane (5), smooth, planar to undulating 1 432.3' - Mechanical break R47: 9 minutes 2 Peat 433.3-433.9' - black to dark brown 434.0 NR black, (N1 to 5YR 2/1), laminated to SC-7S collected at 434.0thin bedding, organic and silt 2 434.25' 434.55, 434.7' - Bedding plane, between rock No Recovery 433.9-434.0' 435 and clay or organic detritus -392.6 Peat 434.0-434.65' - Same as 433.3-433.9/ 1 435.65' - Bedding plane, rough, undulating Limestone 434.65-435.7' - limestone fragments, R48-HC 436.2' - Bedding plane, horizontal and 7 deg, variegated, random size and type in 3 22 5 ft rough, undulating, fossil cast openings 436.4' - Bedding plane, smooth, undulating, 88% variable matrix, trace to some organics rock with silica rich gravel 436.75' - Fracture, 35 deg and vertical, 435.7-436.5' - yellowish gray, (5Y >10 7/2), very fine grained, moderate to smooth, filled with carbonate fragments and strong HCl reaction, very strong (R5), R48: 12 minutes 1 silty clay voids (<1/16") over 5-10% of surface, 436.9-437.7' - Fracture zone, multiple NR angular cavities (1/2 to 3/4") and 439.0 fragments up to 1-1/2" some organic infill and open 1 438.0' - Mechanical break 440



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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 8/16/2007 END: 8/24/2007 LOGGER: P. De Sa'rego, J. Townes, R. Bitely, M. Faurote, C. Sump DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -397.6 439.9, 440.5, 441.0' - Mechanical break (3) Peat 3 436.5-436.6' - brownish black, (5YR 2/1), platy, malleable, parting tendencies, HCl reaction on parting R49-H0 441.25, 441.4' - Bedding plane (2), rough, surfaces 42 4 5 ft planar, 1/16" open 94% Conglomerate 441.6' - Bedding plane, 60 deg, rough, 436.6-436.95' - strong HCl reaction, planar, 1/16" open, planar fracture with extremely weak (R0), variegated, limestone fragments (1/2"x3/8") and >10 organic material as sporadic blebs 442.2-444.0' - Fracture zone, very strongly silica grains (up to 5/16"), trace R49: 10 minutes >10 broken rock fragments in silty sand or sandy organics, angular silica NR 444 0 Limestone 436.95-437.5' - grayish orange, 2 (10YR 7/4), very fine grained, 444.6, 444.95' - Bedding plane (2), rough, 445 moderate HCI reaction, medium stepped to undulating, fragmented -402.6 strong (R3), thin bedding, 5 to 10% separations 2 discontinuous organic stringers and 445.3' - Fracture, 75 deg, rough, irregular, blebs trace organics 437.5-437.7' - very pale orange, (10YR 8/2), very fine grained, strong HCl reaction, extremely weak (R0), R50-HQ 446.1-446.3' - Fracture, vertical, multiple 5 ft 8 >10 small fractures throughout 92% laminated bedding, organic partings, undulant to scour like bedding 437.7-438.4' - moderate orange pink >10 (5YR 8/4), very fine grained, mild HCI R50: 8 minutes >10 reaction, weak (R2), voids (1/16") NR over <5% of surface, trace organics, 449.0 fossil molds infilled, recrystallized 449.0-450.1' - Fracture zone, random carbonate minerals >10 orientations, fragments to 2-1/2" x 2" No Recovery 438.4-439.0' 450 407.6 Limestone 439.0-441.25' - vellowish grav. (5Y >10 7/2), very fine grained, very strong 450.6' - Fracture, 70 deg, rough, planar HCl reaction, very strong (R5), 450.7-454.0' - Bedding plane or fracture R51-HQ >10 zone, smooth, undulating 5-10% blebs and stringers of organic 8 5 ft material, voids (<1/8") over 5% of surface, 1-1/2 x 1/2" cavities, lined or 52% partially lined with calcite NR Peat 441.25-441.5' - black. (N1). above R51: 13 minutes carbonate derived silt 454.0 Limestone 441.5-443.7' - pale brown to pale 454.0-454.6' - Fracture zone >10 vellowish brown, (5Y 5/2 to 10YR 455 6/2), moderate HCl reaction, 454.8, 454.95' - Fracture (2), 15 deg and 30 -412<u>.6</u> extremely weak to very weak (R0 to deg, rough, undulating, recrystallized R1), limestone fragments, trace 2 455.15, 455.6' - Bedding plane (2), smooth, organics planar No Recovery 443.7-444.0' R52-HC 455.7' - Fracture, 75 deg, undulating to >10 5 ft 20 Peat planar 58% 444.0-444.1' - black, (N1), amorphous 457.2-459.0' - Bedding plane or fracture Limestone zone, horizontal, smooth, undulating NR 444.1-448.6' - light brown, (5YR 5/6), R52: 12 minutes very fine to fine grained, mild to moderate HCl reaction, very weak to 459.0 strong (R1 to R4), voids (<1/8") over 459.0-460.0' - Fracture zone, fragments to 15% of surface >10 3"x2"x1' No Recovery 448.6-449.0'



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ORIENTATION: Vertical

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 8/16/2007 END: 8/24/2007 LOGGER: P. De Sa'rego, J. Townes, R. Bitely, M. Faurote, C. Sump DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -417.6 Limestone 5 460.3, 460.4, 460.6, 460.65, 460.95' -449.0-451.5' - yellowish gray, (5Y Mechanical break or bedding plane (5), 60 7/2), very fine grained, mild to very strong HCl reaction, strong to very deg, trace organic staining R53-HQ 461.3' - Fracture, 60 deg, rough, undulating, strong (R4 to R5), voids (<1/8") over 0 >10 5 ft intersecting 461.7-462.0' - Fracture zone, 60 deg, rough, 84% 10% of surface No Recovery 451.5-454.0' undulating, angular 462.1' - Bedding plane, smooth 462.4, 462.6' - Fracture (2), 45 deg, >10 Peat 454.0-454.1' - brown black, (5YR 2/1) 2 R53: 14 minutes Limestone undulating, one healed is parallel to these, 454.1-456.9' - light brown to pale NR 464 0 yellowish brown, (5YR 6/4 to 10YR 462.8' - Fracture, 85 deg, rough, undulating 463.2' - Fracture, 30 deg and vertical, 6/2), very fine grained, mild to very 2 strong HCI reaction, very strong (R5), smooth, undulating 465 voids (<1/16") over 5-8% of surface, trace cavities (1/2" x 1/4"), trace 463.3' - Fracture, vertical, smooth, undulating 464.1' - Fracture, 45 deg, rough, undulating -422.6 >10 organics 464.6' - Mechanical break, 10 deg, core No Recovery 456.9-459.0' pieces spun against each other R54-HC Silt (ML) 465.1' - Fracture zone, 70 deg, rough, planar, 5 ft 17 >10 459.0-459.2' - with subrounded may extend to 496' with multiple fragments 86% gravel to 1/2" between Limestone 466.0-467.0' - Fracture zone, fragments to 2", >10 459.2-461.8' - moderate yellow brown, (10YR 5/4), very fine to fine sporadic organic staining 467.8' - Fracture, 15 deg, rough, undulating, >10 R54: 13 minutes grained, mild to strong HCl reaction, angular NR very weak to weak (R1 to R2), thin 468.0' - Fracture, 20 deg, rough, undulating, 469.0 bedding, voids (<1/16") over 10-15% angular of surface 469.3' - Bedding plane, rough, stepped to 2 Fine Sand (SP) 461.8-462.0' - dusky yellow, (5Y 6/4), planar, organic staining locally 470 427.6 469.6' - Bedding plane, rough, stepped to carbonate planar, organic staining 470.05' - Bedding plane, smooth, undulating, 5 Limestone 462.0-462.75' - moderate yellow contact R55-HQ brown, (10YR 5/4), very fine to fine 470.4' - Fracture, 45 deg, smooth, planar, intersecting, fractures at a bedding plane parting with veneer to laminar bedded black 31 >10 5 ft grained, mild to strong HCl reaction, 90% very weak to weak (R1 to R2), thin bedding, voids (<1/8") over 10-15% (organic) material 2 471.05' - Fracture, rough, irregular, trace of surface Silty Sand (SM) organics 2 462.75-463.0' - very fine grained, 471.1-471.5' - Fracture zone, stepped, NR irregular, fracture along suture type material carbonate 474.0 471.9' - Bedding plane, stepped to undulating Limestone 472.55' - Fracture, horizontal, rough, 463.0-463.2' - yellowish gray, (5Y 4 undulating 7/2), very fine grained, moderate HCI 475 reaction, very weak (R1), small blebs of black organics throughout 472.8' - Fracture, 60 deg, smooth, undulating, 432.6 trace organics >10 473.3' - Fracture, 15 deg, rough, undulating 474.6' - Fracture, vertical, rough, planar 474.95' - Fracture, vertical, rough, undulating, No Recovery 463.2-464.0' Limestone R56-HC 464.0-464.65' - pale reddish brown, 3 5 ft 24 angular (10R 5/4), very fine grained, 94% 475.2-476.1' - Fracture zone  $\pm$ moderate HCl reaction, strong (R4), 476.5' - Fracture, 15 deg, rough, undulating, voids (<1/16") over 5% of surface 464.65-466.1' - grayish orange, 3 Δ angular Δ 476.7' - Fracture, 75 deg, rough, undulating 477.2' - Fracture, 60 deg, rough, undulating, (10YR 7/4), very fine grained, R56: 9 minutes Δ delayed mild HCI reaction, medium 2 infilled, limestone fragments and fines Δ strong (R3), thin bedding, irregular 479.0 NR 477.6' - Fracture, 5 deg and 30 deg, bottom bedding of previous fracture area >10 477.9' - Fracture, 85 deg, rough, undulating 480



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SHEET 15 OF 16

ORIENTATION: Vertical

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

CORING METHOD AND EQUIPMENT : BL300T S/N 1517, mud rotary, HQ tools, HW casing

00111110	- WETTIOD 7	,D L	ZOII IV	TENT . BESOUT S/N 1517, Mud totally, HQ tools, HW cas	iiig			—	ORIENTATION . Vertical
WATER	LEVELS: 5.8	88 ft b	gs on	9/13/07 START : 8/16/2007 END : 8/	24/20	07	LOGGER : P. De Sa'rego, J. To	<u>w</u> c	nes, R. Bitely, M. Faurote, C. Sump
				DISCONTINUITIES			LITHOLOGY		COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)			•	SYMBOLIC LOG	⊢	202001	$\dashv$	00
ΠĄΣ O Z	ŽĀ∑ VĀŽ		FRACTURES PER FOOT	DESCRIPTION	]		ROCK TYPE, COLOR,		SIZE AND DEPTH OF CASING,
뿝병은	돌·프	(%) Q	120		7 ≍		MINERALOGY, TEXTURE,	- 1	FLUID LOSS, CORING RATE AND
±ĕ,≷	GTE	) O	P.F.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BC		WEATHERING, HARDNESS,		SMOOTHNESS, CAVING ROD
989	B R R R R R R R R R	Ø	RA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	I≥		AND ROCK MASS CHARACTERISTICS	- 1	DROPS, TEST RESULTS, ETC.
	078	ď	Ь	THE MALESO, COM MOLES IN MANAGE, MALESTICATIVE CO	S		OTHEROTERIOTIO		
-437.6				478.15' - Fracture, 60 deg, smooth, planar	ш	П	Limestone		
-			>10		┰	₽∥	466.1-468.3' - dusky yellow, (5Y 6/4),		-
_				479.0-481.0' - Fracture zone, 60 deg, random	₽	LI	very fine to medium grained, mild to		_
	R57-HQ			fragments 1/2 to 2", 480.7-481.6' is single	Н	1	moderate HCl reaction, extremely		Driller's Remark: Lost
-	5 ft	26	>10			₽∥	weak to strong (R0 to R4), granular,	П	circulation on this run,
_	74%			481.0-481.3' - Fracture zone, random angles,	$oldsymbol{\perp}$	₽I	voids (<1/16") over 18-20% of		water column dropped to
				sizes from 1/4" to 2", average about 3/8"	$\vdash$	1	surface	11	50' below top of casing
_			0	482.2' - Bedding plane, 0-5 deg, smooth,	╁	₽I	No Recovery 468.3-469.0'		7
_				undulating	╁┯	t-l	Limestone		Deg
			1 1			1	469.0-470.15' - Same as 466.1-468.3'	П	R57: 6 minutes
_	404.0					ΙI	470.15-471.5' - light brown, (5YR	П	7
-	484.0		NR		1	₽I	6/4), very fine grained, moderate to	П	-
			3	484.3' - Mechanical break, 15 deg, smooth,	╨	Ll	strong HCl reaction, weak (R2),	ı	
485			3	undulating	Н	ſ	laminated to very thin bedding, black		1
-442.6			<b>-</b>	484.55' - Mechanical break, 15 deg, smooth,		Н	beds, lenticels and lenses, at 470.45'		-
-442.0			1	undulating		L	and 471.0' beds to 1/4"		
			'	484.75' - Bedding plane, 30 deg, smooth,	$\vdash$	l	471.5-482.25' - light brown, (5YR		
-	R58-HQ			undulating	₩	╂╵	5/6), very fine to fine grained, weak		-
l _	5 ft	43	3	485.8' - Mechanical break	ᅪ	L	to very strong HCl reaction, very		Driller's Remark: Lost _
	95%	40		486.2' - Fracture, edges do not match, could		1	weak to medium strong (R1 to R3)		circulation in large cavity
-	0070			be up to 0.3' separation	仜	ŀ	No Recovery 473.7-474.0'		where the two opposing -
-			>10	486.7' - Mechanical break or bedding plane,	╁	Ł	Limestone		fragments do not match
				smooth, undulating		ł	475.2-475.8' - limestone fragments in		indicating the cavity
-			4.0	487.6-488.3' - Fracture zone, fragments from	T	T.	carbonate silt, fracture or cavity infill,		exceeds the apparent
-			>10	1/8" to 1"		┡	fragments subangular to		volume
l _	489.0		NR	488.4' - Fracture, 65 deg, rough, planar, flat	$\perp$	L	subrounded, 15% voids (<1/8") and		R58: 10 minutes
	·			489.05, 489.35, 489.5, 489.6' - Bedding plane	$\vdash$	Г	fossil molds (up to 3/8")		
-			9	(4), smooth, flat	+-	╂	Breccia		-
490_				489.75, 489.85' - Bedding plane (2), 65 deg,		L	477.0-477.6' - sand and silt matrix		
-447.6				rough, planar		1	No Recovery 478.7-479.0'		
-			6	489.9, 490.0, 490.15, 490.3, 490.6, 490.85,	╨	Ł	Limestone		7
-	550.110			491.05, 491.3, 491.5, 491.68, 491.9' -	╁┯	╊	482.85-487.7' - grayish orange, dark gray, (10YR 8/2, N3), very fine	- 1	-
	R59-HQ	!   19	5	Bedding plane (11), smooth, flat		1	grained, moderate HCl reaction,	- 1	
	5 ft 82%	19	၂၁			Γ	weak to medium strong (R2 to R3),		
-	02/0				┺	Ł	voids (<1/8") over 5-15% of surface,	- 1	-
				492.15' - Fracture, 20 deg, rough/smooth,	⊢	Ł	fossil molds filled or partially infilled	- 1	SC-6 collected at 492.2-
I			1	undulating	$\vdash$	1	with aragonite/calcite, cavities range		493.15'
I -			<u> </u>		Ė	ŀ	to greater than width of core and over		R59: 10 minutes
l -			NR	,	$\prod$	Į.	2" high, trace organics (shells or		1.00. 10 11
	494.0		''''		$\vdash$	1	shell fragments)	-	
I -				•	┰	t	No Recovery 482.7-484.0'		┪
l -			2		+	1	Limestone		_
495				494.6' - Fracture, 15 deg, smooth, undulating		1	487.7-491.7' - dusky yellow to light		
-452.6				494.9, 495.0, 495.15, 495.3, 495.9' - Fracture	ш	Г	brown with 1 to 2" grayish orange,	-	
-			4	(5), horizontal and 10 deg, smooth,	╁	╂	(5YR 6/4 to 10YR 7/4), very fine to		
I _				undulating	╨	L	fine grained, mild to strong HCI		
I -				496.1' - Bedding plane, horizontal, smooth,		1	reaction, very weak to medium		7
-	R60-HQ		2	planar, lithology change	亡	F	strong (R1 to R3), voids (<1/16") over 15-30% of surface, solution		-
_	6 ft	62		496.5' - Mechanical break	ш	Ł	cavities (1/2" to 2-1/2"x2")		_
	92%	J-	ا ہ ا		$\vdash$	1	No Recovery 488.75-489.0'		
-			2	497.5' - Fracture, rough, planar, angular,	+-	t	Limestone	- 1	7
l -			<u> </u>	stepped	┲	1	490.1-492.0' - numerous thin		4
			^	497.95' - Fracture, 55 deg, rough, planar,		1	dissolution cavities subparallel to		
I -			2	gently arcuate	₽	Г	bedding		1
-			<u> </u>	498.4' - Fracture, horizontal and 20 deg,	+	₽	491.5-497.0' - extremely weak to very		-
I _			1	rough, irregular	$\Gamma$	L	weak (R0 to R1), 1/4" black organic		
500	500.0		NR	498.75' - Fracture, 45 deg, rough, planar	Ш	1	bed at/near contact		
- 500	550.0				1	t		$\dashv$	
					1	1			



PROJECT NUMBER:	BORING NUMBER:					
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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723083.8 N, 458040.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: A. Anderson

WATER	LEVELS : 5.8			,	END : 8/2	24/20	07	LOGGER : P. De Sa'rego, J. To	ownes, R. Bitely, M. Faurote, C. Sump
			,0 0	DISCONTINUITIES	2.12 . 0/1		Ĭ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION		SYMBOLIC LOG	Г	ROCK TYPE, COLOR,	OUTE AND DEET : OF CASC :
H H H	RUN TH, A VER	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROU	CHNESS	OLIC		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
THA EVA	NGT NGT	αD	ACT R F	PLANARITY, INFILLING MATERIA	L AND	MBC		AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	SHR	ñ	E.E.	THICKNESS, SURFACE STAINING, AND	TIGHTNESS	SΥ		CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
_				\ 499.0' - Mechanical break \ 499.2-499.5' - Fracture zone	/_			Limestone 491.7-500.0' - very pale orange to	
_				455.2 455.5 Tradiare 2016				grayish orange, (10YR 8/2 to 10YR	_
l _					_			7/4), very fine to fine grained, mild HCl reaction, very weak to medium	_
								strong (R1 to R3), voids (<1/16")	
							Π	over 10% of surface, voids (<3/8") over 5% of surface, trace larger	
					-			cavities	
_					-			No Recovery 493.1-494.0' Limestone	
_					-			495.35' - very weak to medium	
_					-			strong (R1 to R3), wavy to undulant silt sized laminae with organic	
_					-			interbeds, <1/2" total thickness	
					_			496.2' - very weak to medium strong (R1 to R3), wavy to undulant silt	_
					-	1		sized laminae with organic interbeds,	-
					_		Γ	<1/2" total thickness 498.45' - very weak to medium	_
					-		Γ	strong (R1 to R3), wavy to undulant	
					=			silt sized laminae with organic interbeds, <1/2" total thickness	
_					-			No Recovery 499.5-500.0'	_
_					-		r	Bottom of Boring at 500.0 ft bgs on	_
_					-	1	r	8/24/2007	_
_					-		r		-
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

AD-04

SHEET 1 OF 16

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

				EINT : DIEURCH D-120 3/N 620, BE3001 3/N 1317, IIIIdd		-	ORIENTATION: Vertical
WATER	LEVELS : 5.8	38 ft bo	gs on 9		27/20		
≳∩⊋	<u> </u>			DISCONTINUITIES	ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ᆲ빓읃	P.H. A.H.	(%) Q	꾼	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	<b>1</b> 💥	MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
₽₹¥	# <u>2</u>	αD	ACI R F	PLANARITY, INFILLING MATERIAL AND	MB(	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SS	SEES	RG	F.F.	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SY	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-157.4						No Recovery 200.0-212.0'	Boring AD-4 blind drilled to
-					╆	-	approximately 200 feet -
-					╀	-	below ground surface
I _					ш	_	before beginning sampling/logging.
					Н		"Water level is based on
I -							Ground Water Monitoring
-					₩	<del>-</del>	at LNP site (FSAR Table - 2.4.12.08)"
-						-	8/26-8/29/07: Sonic casing
-					+	-	at 200.0' below ground -
1 -					Ė	<b> </b>	surface, attempt
I _					╨		advancement of HQWL with only 2.5' of -
205					Ш		advancement, no recovery
-162.4				_	$\vdash$		of material and two rock
-					Ė	-	coring bits (#636) _ destroyed
-					₩	-	9/5/07: Sonic rig setup on
-					ш	-	AD-4, advances sonic
_					╁┯	-	4"core barrel from 202.5- 207.5' below ground
l _							surface, no recovery of
							material due to broken
							HQWL bit plugging Sonic core barrel; no voids noted;
_					H	-	HQWL bit removed,
-						-	advance 207.5-213' below
-					₩	-	ground surface _
210 -167.4				_	H	-	Advance Sonic 4" casing to
-107.4					╁┯	_	213' below ground surface;
l _					$\perp$	_	retrieve 5.0 of crushed
							limestone fragments and
	212.0				Ш		limestone core segments, – 4" long each; no void
-				212.0-213.0' - Fracture zone, rough, angular	ш	Limestone	space; set Sonic 6" casing
-	R1-HQ		>10	to undulating, limestone fragments, <2"	╁	- 212.0-213.0' - yellowish gray, (5Y	to 210.0' below ground - surface;
-	2 ft	0		diameter fracture zone	E	7/2), very fine to fine grained, strong HCl reaction, weak to strong (R2 to	R1: 13 minutes
1 -	50%		NR		╀	<ul> <li>R4), voids &lt;1/16" over 30% of</li> </ul>	-
I -	214.0					surface, poorly fossiliferous with few	0/0/07: Danis na 1
I -			2		<u> </u>	fossils <1/4" diameter, no organics, no cavities	9/6/07: Begin rock coring after advancing HWT -
215	R2-HQ		L	214.8, 215.0' - Bedding plane (2), <10 deg, —	F	No Recovery 213.0-214.0'	casing to 2.38' below
-172.4	2 ft 100%	33		rough, undulating		213.0-214.0	ground surface, 1.0'
-	216.0		>10	215.25-215.85' - Fracture zone, rough,	Ш	- <b>Limestone</b> 214.0-216.0' - yellowish gray, (5Y	material inside casing to – 212.0', core blockage at
1 -	£ 10.0			undulating, limestone fragments <2" diameter	tr	7/2), very fine to fine grained, strong	214.0' bgs due to fragment
-			>10		F	HCl reaction, weak to medium strong  (D2 to D2) viside (1/16" aver-	locking in sample barrel;
-				216.8-216.95' - Fracture zone, <10 deg and	t	(R2 to R3), voids <1/16" over 10-40% of surface decreasing with	no further advancement for R1, limestone inside casing
-			1	<20 deg, rough, undulating, limestone fragments <2" diameter, hadding plane	$\mathbf{H}$	<ul> <li>depth, few cavities, poorly to</li> </ul>	to 212.0',
1 _				fragments <3" diameter, bedding plane fractures with high angle intersecting	口	moderately fossiliferous with fossil	SC-1 collected at 214.0-
	R3-HQ			fractures	F	casts <1/4" diameter, trace laminated bedding	214.8' R2: 5 minutes
	5 ft 90%	56	3	217.25, 218.15, 218.25, 219.15, 219.4' -	Ľ		
-				Bedding plane or mechanical break (5), <10 deg, rough, undulating	盰	<u> </u>	1
			>10			<del> </del>	1
220				_	1		_
					1		
			ı		1		



PROJECT NUMBER: BORING NUMBER: 338884.FL

**AD-04** 

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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER	LEVELS : 5.8	8 ft bg	gs on 9	9/13/07 START : 9/6/2007 END : 9/	27/20	D7 LOGGER : R. Bitely, J. Townes,	S. Roberti, K. Waikins
>∩ ∵	. (9			DISCONTINUITIES	ق	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE	OVEF.	D (%)	TUF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURF.	SORE	RQD	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3.Y.ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-1 <b>77</b> .4	0716	Ľ		219.4-219.85' - Fracture zone, rough,	5)	Limestone	Consistent slow to
			>10	undulating, limestone fragments <2" diameter	厈	<ul> <li>216.0-221.0' - yellowish gray, (5Y</li> </ul>	moderate drilling rate with -
_	221.0		NR	219.85, 220.3' - Bedding plane (2), 30 deg and 70-90 deg, rough, undulating	世	7/2), very fine to medium grained, strong HCl reaction, medium strong	approx. 50% circulation _ return; circulated mud is
-			3	220.3' - Fracture zone, rough, undulating,	╀┼	<ul> <li>to strong (R3 to R4), voids &lt;1/16"</li> </ul>	losing to formation through -
-				limestone fragments <2" diameter 221.75-221.9' - Fracture or mechanical break		over 10-30% of surface, variable, moderately fossiliferous with several	4" HWT's, 6" sonic casing gap
_			3	(2), <30 deg, rough, undulating, 3 fractures	口	<ul> <li>fossil casts/molds &lt;1/2" diameter,</li> </ul>	SC-2 collected at 218.3-
_	DALIO			222.15' - Fracture or mechanical break, <10 deg, rough, undulating, 3 fractures		few cavities <1", trace organic laminations	219.15' R3: 9 minutes
_	R4-HQ 5 ft	25	>10	222.25' - Fracture or mechanical break, 40	$\bot$	<ul> <li>No Recovery 220.5-221.0'</li> </ul>	-
_	52%			deg, rough, undulating 222.5' - Bedding plane or mechanical break,		Limestone 221.0-223.6' - yellowish gray to light	-
_				rough, undulating		gray, (5Y 7/2 to N7), very fine to	1
225			NR	223.2-223.35' - Fracture zone, rough, undulating, silt lens, limestone fragments <1"	$\vdash$	medium grained, strong HCl reaction, very weak to strong (R1 to	D4. 5 minutes
-182.4 -				diameter with silt lens	Д	<ul> <li>R4), strength decreasing with depth,</li> </ul>	R4: 5 minutes
-	226.0				口	voids <1/16" over <10-25% of surface, few cavities up to 2"x1",	
			>10	226.3-226.9' - Fracture zone, multiple	$\vdash$	poorly to moderately fossiliferous	
				intersecting fractures with rock fragments up to 1-9/16" diameter	F	with few fossil molds and casts <1/2" diameter, secondary infill present	
_			>10	226.95, 227.0, 227.1' - Fractures (3), 60 deg,		over <30% of surface; 223.2- 223.35'	_
_				rough, undulating, three intersecting fractures	片	silt lens with limestone fragments <1" diameter, rough, calcareous silt	_
_	R5-HQ 5 ft	24	4	Y shaped, moderate relief (~3/8") 227.25' - Fracture, 30 deg, rough, undulating,		No Recovery 223.6-226.0'	_
_	78%		·	~3/8" relief, fossil molds		Limestone - 226.0-229.9' - yellowish gray, (5Y	
_			4	227.7-227.9' - Fracture zone, multiple intersecting fractures with rock fragments up		_ 7/2), very fine to fine grained, weak	
230				to 1-3/16" diameter 228.3' - Fracture, 30 deg, rough, undulating,	士	HCl reaction, very weak to weak (R1 — to R2), voids <1/16" over 20% of	
-187.4			NR	relief ~3/8"	┢	rock surface mostly along bedding	R5: 10 minutes
_	231.0			228.5' - Fracture, 80 deg, rough, undulating, low relief		surfaces; cavities up to 3" diameter cover 5% of rock surface and are	_
_			>10	228.65, 229.0, 229.35' - Bedding plane (3),		_ dissolution fossil molds; trace	_
_				80 deg, rough, undulating, stepped, low relief 229.8-229.9' - Fracture zone or mechanical	世	laminations, fossiliferous  No Recovery 229.9-231.0'	14
			>10	break	$\vdash$	Limestone	Driller's Remark: Rapid advancement at 232.0-
	_			231.0-231.9' - Fracture zone, multiple intersecting fractures with rock fragments up	厂	231.0-233.0' - yellowish gray, (5Y – 7/2), very fine to fine grained, weak	233.0' and 234.0-235' due
	R6-HQ 5 ft	0		to 1-3/16" diameter	口	to moderate HCl reaction, weak to	to possible void space or unconsolidated material
	40%			232.15' - Fracture, 50 deg, rough, undulating, 3/8" relief		medium strong (R2 to R3), voids up to 3/16" cover 10% of rock surface,	_
			NR	232.3-232.4' - Fracture zone	厂	poorly fossiliferous	]
235			`	232.55' - Fracture, 60 deg, rough, undulating, 3/8" relief —	片	No Recovery 233.0-236.0'	
-192.4				232.9-233.0' - Fracture zone	片	<u>-</u>	R6: 3 minutes
	236.0				$\vdash$		]
			>10	236.0-237.2' - Fracture zone, multiple intersecting fractures with rock fragments up	$\Box$	<b>Limestone</b> - 236.0-239.2' - yellowish gray, (5Y	]
				to 1-9/16" diameter	Д	7/2), very fine to fine grained,	]
			>5	237.2' - Fracture, 30 deg, smooth, stepped,	$\vdash$	moderate HCl reaction, weak to medium strong (R2 to R3), voids up	SC-3 collected at 237.2-
			. 5	low relief	$\vdash$	to 3/8" 20% of rock surface, poorly	238.0'
	R7-HQ 5 ft	32		238.0' - Mechanical break, 30 deg, rough, undulating, tight, hardness test	F	fossiliferous, trace organics	]
	64%	J2	>10	238.85-239.2' - Fracture zone	片	_	]
				200.00-200.2 - 1 lacture 2016	H	No Recovery 239.2-241.0'	]
240					F		
					1		



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

				IENT : Dietiicii D-120 3/N 620, BE3001 3/N 1317, Iliuu i			ORIENTATION: Vertical
WATER	LEVELS : 5.8	88 ft b	gs on s		27/20		
ŞQ⊋	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	ဗ္ဂ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	ÄŽ ŽŽŽ		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
	동두취	(%) Q	150 100 100 100 100 100 100 100 100 100	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ğ	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EV.	S S S S S S S S S S S S S S S S S S S	Ω	RAC:	PLANARITY, INFILLING MATERIAL AND	ΜB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SE	898	Ř	FR	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Sγ	CHARACTERISTICS	Bitor o, reor reodero, ero.
-197.4			NR		Ш		R7: 3 minutes
_	241.0			-	h	=	1
-	241.0			241.0-242.2' - Fracture zone, multiple		_ Limestone	-
-			>10	intersecting fractures with rock fragments up	++	<ul> <li>241.0-242.2' - yellowish gray, (5Y</li> </ul>	-
_			>10,	to 1-3/16" diameter		7/2), very fine to fine grained,	Drillaria Damariki Danid
_			<u> </u>		Н	moderate HCl reaction, weak to - medium strong (R2 to R3), voids up	Driller's Remark: Rapid, consistent drilling; potential -
						to 3/32" cover 5% of rock surface,	cavity or silt infill washed
	R8-HQ				Н	trace organics	out during drilling
-	5 ft 24%	0		-	Ш	- No Recovery 242.2-246.0'	1
_	,,		NR	-		-	1
				-	$\vdash$	-	-
245 <u> </u>				_		<del></del>	R8: 2 minutes
-202.4					ш	-	Ro. 2 Illinutes
	246.0					_	_
			. 10	246.0-247.0' - Fracture zone, multiple		Limestone	Driller's Remark: Potential cavity at 246.0-250.0' or silt
			>10	intersecting fractures with rock fragments up to 2" diameter	Ľ	<ul> <li>246.0-247.0' - yellowish gray, (5Y 7/2), very fine to fine grained, weak</li> </ul>	zone washed out
-				to I diameter	ш	to moderate HCl reaction, weak to	consistent 50% circulation
-				-		- medium strong (R2 to R3), voids up	-
_	R9-HQ				+	to 3/32" cover 1-2% of surface, poorly fossiliferous	-
_	5 ft	0				- No Recovery 247.0-251.0'	-
_	20%		NR		ш	- -	_
			' ' '				
250					Н		
-207.4				_	跓		9/6/07: Complete drilling at
-	251.0			•	ш	-	17:00, water level at - surface
-	251.0			<u> </u>		Limestone	9/7/07: Re-spool 650.0'
-			>10	251.2' - Mechanical break or fracture, rough, undulating, angular rock fragment potentially	$\vdash$	<ul> <li>251.0-251.2' - yellowish gray, (5Y</li> </ul>	wireline, transmission -
_				fallen from above onto top of run, no		7/2), very fine to medium grained,	down time for repair, start
_			>10	discernible rock contact/fracture angle	₽	strong (R4), no voids, cavities or fossil, light organic stain on <30% of	drilling at 12:15
				251.85-252.05' - Fracture zone, rough, undulating, multiple intersecting fractures	Ш	surface	
]	R10-HQ		>10	252.5' - Fracture or mechanical break, 60-70	$\vdash$	251.2-252.6' - yellowish gray, (5Y	Driller's Remark: at 253.0-
	5 ft 50%	18		deg, rough, undulating, variable	Ľ	<ul> <li>7/2), strong HCl reaction, very weak to weak (R1 to R2), voids &lt;1/16"</li> </ul>	254.0' light chatter; core – blockage at 254.25'
-	33,3			252.6-253.5' - Fracture zone, rough, undulating, interbedding with silt seams	Н	over 20-30% of surface, poorly	2.03.1430 41.20
-			NR	undulating, interpedding with siit seams	匚	- fossiliferous, trace laminated bedding	-
255_ -212.4			INIT	_	+	252.6-253.5' - yellowish gray, (5Y 7/2), extremely weak (R0), silt lenses	R10: 5 minutes
						<ul> <li>interbedded</li> </ul>	10.5 minutes
	256.0					No Recovery 253.5-256.0'	]
			>10	256.0-257.5' - Fracture zone, rough, undulating, intersecting fractures and gravel	Ш	Limestone - 256.0-259.75' - yellowish gray, (5Y	
			- 10	sized fragments 3" diameter	Н	7/2), very fine to medium grained,	1
					F	strong HCl reaction, extremely weak	Driller's Remark: at 257.0-
-			>10		Ľ	<ul> <li>to weak (R0 to R2), voids &lt;1/16"</li> <li>over &lt;10% of surface, poorly</li> </ul>	259.0' light to moderate -
-	R11-HQ				ш	fossiliferous, trace organic	chatter, consistent drilling rate
-	5 ft	15	>10	258.3-258.5' - Fracture zone, rough,	士	<ul> <li>staining/laminar from 256.0 to 257.0';</li> </ul>	4
_	75%			undulating, gravel sized fragments <2"	$\vdash$	laminated bedding predominant from 258.8 to 259.75'	
			>10	diameter 258.5' - Mechanical break or fracture, 50 deg,	片	- 200.0 to 208.70	
260				rough, undulating	Ш		



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER	LEVELS : 5.8	88 ft bo	gs on 9	9/13/07 START: 9/6/2007 END: 9/	27/200	7 LOGGER : R. Bitely, J. Townes,	S. Roberti, K. Waikins	
>∩ ∵	(9)			DISCONTINUITIES	ڻِ	LITHOLOGY	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,	
H BI	E RU STH, OVEF	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD	
SUR	SOR	RQ	-RA(	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3×MI	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.	
-217.4	011			258.8-259.75' - Fracture zone, rough to		No Recovery 259.75-261.0'	R11: 4 minutes	
-	004.0		NR	smooth, undulating to planar, intersecting fractures and gravel sized fragments up to	╁┼		-	
-	261.0			<2" diameter, rough to smooth transitioning	Ħ	No Recovery 261.0-266.0'	-	
_				with depth, bedding plane fractures with intersecting vertical fractures prevalent from	口	-		
_				259.0-259.75'	Ш		Driller's Remark: Rapid	
					Ħ		advancement 262.0-265.0' - below ground surface,	
	R12-HQ	0 NR	ND		Ш		possible voids or silt lens; continuous circulation	
	5 ft 0%		U INK		Н		(approximately 50% return)	
					П		through run; minimum of pump pressure increasing -	
265				_	Щ	_	intermittently through run	
-222.4					Д		indicating core/fluid blockage due to formation -	
_	266.0				口	N- B	back pressure on equipment, likely silt/soil	
_					Ш	No Recovery 266.0-271.0'	zone washed out to	
_					╁┼┼		formation R12: 5 minutes	
-					H		Driller's Remark: Rapid _	
-	R13-HQ					冄		advancement 266.0-271.0' below ground surface, as
_	5 ft	0	NR		Ħ		above, no recovery due to _ unconsolidated silt/soil	
-	0%				甘		concentration; pressure on	
270					Ш		flow increasing during _ drilling indicating back	
-227.4				_	╁╁	_	pressure from formation; —	
_	271.0				₩	-	HQ core barrel set on formation at 271.0' below ground surface with no free rod drop: material is present but not retrievable	
_	271.0		>10	271.0' - Fracture, rock limestone fragments	ш	Limestone		
				up to 12" in size 271.0-271.1'	Ш	271.1-271.25' - yellowish gray, (5Y 8/1), very fine to fine grained,		
	R14-HQ				ш	moderate HCl reaction, very weak	due to unconsolidated - nature	
	3 ft 8%	0	NR		Ш	(R1), 5% small voids up to 1/16"  No Recovery 271.25-274.0'	R13: 4 minutes  K. Watkins and Robert	
					Ш		logging	
-	274.0				Н	·	Coring Equipment: BL 300T -	
1 -					H	No Recovery 274.0-279.0'	R14: No Time Recorded	
275_ -232.4				_	뭐	_		
-232.4					Ħ		-	
1 -	R15-HQ				Ħ		Driller's Remark: Slow	
1 -	5 ft	0	NR		廿		drilling; used 300 gallons of -	
1 -	0%				世	•	muck with no recovery, decision to trip out rod and	
-					╂┴╂		barrel to check bit, bit -	
1 -					円		inspected and appears _ intact, hole tagged at	
-	279.0				口		279.0', tripped back in to - try another run	
1 -	218.0				口		R15: 20 minutes	
280	R16-HQ		4		団		-	
					1	-		



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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 9/6/2007 END: 9/27/2007 LOGGER: R. Bitely, J. Townes, S. Roberti, K. Waikins DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD <u>∪</u> MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -237.4 '2 ft 279.4, 279.6, 279.85, 279.9, 280.3, 280.4, Driller's Remark: More Limestone 95% >10 280.5, 280.65, 280.75' - Fractures, horizontal, 279.0-279.85' - yellowish gray, (5Y pieces of bit recovered smooth, planar to undulating, horizontal, 7/2), medium grained, moderate HCI R16: 6 minutes 281.0 NR clayey white infilling, open (1/5" pore) reaction, very weak (R1), <1% voids 280.0-280.15' - clay infilling 281.4, 281.5, 281.6' - Fractures (3), 8 on surface, <1/32" R17-HQ 279.85-280.0' - Same as 0 2 ft 279.0-279.85' except yellowish gray, horizontal, rough, planar to undulating, 9/16" R17: 6 minutes 80% >2 (5Y 8/1), with clayey striation Driller's Remark: Slow NR 281.6-281.75' - soft infill, clayey 281.9, 281.95, 282.0, 282.1, 282.3, 282.5, 280.0-280.3' - clay - white, soft, moderate HCl reaction drilling 283.0 2 282.6' - Fractures (7), horizontal, rough, 280.3-280.9' - yellowish gray, (5Y 8/1), very fine grained, moderate HCI stepped 283.0-238.5' - Fracture zone, broken/crushed reaction, medium hard, 25% surface 283.9' - Fracture, 85 deg, rough, stepped, area voids 3/16" 1 No Recovery 280.9-281.0' 9/16" relief 285 284.4, 285.0' - Fractures (2), horizontal, Limestone -242 4 rough, 11-4/5" relief, infill, limestone 281.0-282.6' - light gray, (N7), fine to 2 R18-HQ medium grained, mild to moderate 285.1-285.4' - Fracture zone 50 6 ft 285.5-287.3' - Fracture zone, infill of loose HCI reaction, weak to medium strong 100% medium-grained limestone (R2 to R3), abundantly fossiliferous, 1 voids to 3/16" (molds) No Recovery 282.6-283.0' Limestone 0 SC-4 Collected at 287.3-283.0-283.5' - light gray to pale 288 5' yellow brown, (N7 to 10YR 6/2), mild R18: 16 minutes HCI reaction 1 288.5' - Mechanical break, horizontal, rough, 283.5-285.0' - light gray, (N7), fine to 289.0 stepped, 9/16" relief, across large 1" void medium grained, abundant fossils, voids to 9/16" over 100% (molds) 289.25, 289.5, 289.85' - Fractures (3), 3 285.0-287.3' - loose fragments as in horizontal, rough, stepped, medium 290 limestone, 9/16" relief 283.0 to 283.5' 247.4 287.3-288.4' - light gray to very light 3 gray, (N7 to N8), medium grained, mild to moderate HCl reaction, very 290.9, 291.4, 291.85, 292.25, 292.8, 293.0, R19-HQ weak to weak (R1 to R2), irregularly 294.5, 294.7' - Fractures (8), horizontal, 57 2 5 ft spaced voids to 9/16"; highly rough, stepped, infill, loose, broken 94% fossiliferous 289.0-293.7' - very light gray to very 3 light bluish gray, (N8 to 5B 8/1), very fine grained, mild to moderate HCI R19: 13 minutes 2 reaction, very weak to weak (R1 to R2), some portions clayey, <5% NR 294.0 voids (molds) 294.0-295.2' - Bedding plane, smooth, No Recovery 293.7-294.0' >10 undulating, slight (mt) metal oxide staining, Limestone 295 parting on bedding planes 294.0-295.5' - yellowish gray, (5Y -252.4 8/1), fine grained, weak (R2), poorly 3 to moderately fossiliferous. <5% voids (molds) to 1/16" near 294.0' 295.8, 298.7' - Fractures (2), horizontal, 295.5-298.9' - very light gray to very light bluish gray, (N8 to 5B 8/1), mild to moderate HCl reaction, very weak R20-HC rough, 9/16-1" relief >10 55 5 ft 98% to weak (R1 to R2), poorly to 1 abundantly fossiliferous, voids to 3/4" (molds) R20: 11 minutes 2 299.0 NR No Recovery 298.9-299.0' 299.0-304.0. 304.0-309.0' - Mechanical break >10 (2) 300



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

	LEVELS : 5.8	8 ft bo	gs on 9	9/13/07 START: 9/6/2007 EN	ND: 9/27/20	07 LOGGER : R. Bitely, J. Townes,	S. Roberti, K. Waikins
≥∩≘	_ @			DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTI	Ĭ ₩	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-257.4 - - - -	R21-HQ 5 ft 62%	0	>10		- 1	Limestone  - 299.0-301.0' - very light gray to very light bluish gray, (N8 to 5B 8/1), fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), fossil molds, voids to 3/4" (less than 5%)  - Clayey Limestone 301.0-302.1' - light yellowish gray to	-
305 -262.4	304.0		>10			light bluish gray, (5Y 7/2 to 5B 8/1), very fine grained, moderate HCl reaction, with layers of very weak (R1) dark olive silty clay No Recovery 302.1-304.0' Clayey Limestone 304.0-308.5' - light yellowish gray with bluish gray mottling, (5Y 7/2 with	R21: 16 minutes
-	R22-HQ 5 ft 90%	28	>10 >10 >10 >10			with bluist gray fincting, (ST 7/2 with 5B 8/1), very fine grained, moderate HCl reaction, extremely weak (R0), very poorly unconsolidated, bioturbation filled with bluish gray infill; <5% voids	R22: 15 minutes
31 <u>0</u> -267.4	309.0		NR >10 >10	309.0-310.8, 311.5-311.8, 312.6-312.8' - Mechanical break (3)		No Recovery 308.5-309.0'  Limestone  309.0-310.0' - very light bluish gray with medium bluish gray mottling, (5B 8/1 with 5B 5/1), very fine  grained, very weak (R1)	- -
- - -	R23-HQ 5 ft 90%	43	>10	311.0, 312.2' - Fractures (2), <5 deg, smooth planar to undulating, tight  312.6-312.8' - Mechanical break	oth,	310.0-313.5' - yellowish gray with bluish gray streaking, (5Y 7/2 with 5B 8/1), very fine grained, strong HCl reaction, very weak to weak (R1 to R2), scarce voids (bioturbation)	
315 -272.4	314.0		>10 NR >10			No Recovery 313.5-314.0' - 314.0-318.6' - Same as 310.0-314.0' -	R23: 15 minutes
-	R24-HQ 5 ft 92%	17	>10			- - -	
320	319.0		>10 NR >10	319.0-319.9, 320.8-322.9, 323.4-323.8' - Mechanical break (3)		No Recovery 318.6-319.0'	R24: 15 minutes



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER	LEVELS : 5.8	8 ft b	gs on 9	9/13/07 START: 9/6/2007 END: 9/	27/200	DT LOGGER : R. Bitely, J. Townes, S	S. Roberti, K. Waikins
≥ ∩ ⊕	. (9)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-277.4 - - - -	R25-HQ 5 ft 96%	30	>10	320.05, 320.3' - Mechanical break (2), <5 deg, smooth, undulating, tight to 1/4" open		Limestone  319.0-323.4' - yellowish gray, (5Y 7/2), medium grained, moderate HCl reaction, extremely weak to very  weak (R0 to R1), friable, <5% voids (molds) at 322.0-323.0', otherwise <1%	- - -
- - -	324.0		>10 >10 NR	320.5-320.8, 322.9-323.4' - Mechanical break or fracture zone (2), smooth, undulating		- - No Recovery 323.4-324.0' - Limestone	R25: 15 minutes -
325 -282.4 -	R26-HQ 5 ft	32	>10	324.4-324.7' - Mechanical break, multiple breaks		- 324.0-324.5' - light gray with bluish gray mottling, (N7 to 5B 8/1), moderate HCl reaction, weak (R2), brown organic peat staining 324.5-328.8' - yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, very weak (R1), to	- - - -
- - -	95%	32	>10	- - - -		unconsolidated	- - R26: 15 minutes
330 -287.4 - - - - - -	R27-HQ 5 ft 74%	15	>10 >10 1 0 NR	329.0-330.0' - Fracture zone, loose  330.0-330.4' - Mechanical break, fracture/breakage zone across friable rocks 330.4-331.5' - Mechanical break  331.95' - Bedding plane, horizontal, smooth, undulating, tight to 1/4" open		No Recovery 328.8-329.0' Limestone 329.0-330.0' - light yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, extremely weak (R0), loose 330.0-330.2' - medium dark gray, (N4), medium strong (R3), very hard with calcite filled bioturbation voids Clayey Limestone 330.2-332.0' - yellowish gray, (5Y 8/1), medium grained, strong HCl reaction, extremely weak (R0), loose 332.0-332.7' - Same as 330.0-332.0' except very weak (R1) No Recovery 332.7-334.0'	Driller's Remark: 15:26 - pulling core -  R27: No Time Recorded -
335 -292.4 - - - - - -	R28-HQ 5 ft 100%	62	3 2 1 3 >10 >10	334.6' - Mechanical break, 40 deg, rough, undulating, 3/8" relief (mechanical) 334.75' - Fracture, horizontal, rough, planar, 1/16" relief 335.1' - Fracture, horizontal, rough, 9/16" relief 335.8, 336.7, 337.2' - Fractures (3), 30 deg, rough, undulating, 15 deg, and horizontal, 9/16" relief 337.6' - Fracture, horizontal, rough, planar, loose infill 337.8-339.2' - abundant breaks in very loose limestone		Limestone 334.0-337.6' - yellowish gray, (5Y 7/2), medium grained, moderate HCl reaction, very weak to weak (R1 to R2), abundantly fossiliferous, <5% voids (molds) at 334.0-336.8', voids to 3/8"	SC-5 Collected at 335.9-336.6'  5.6' of recovery in R28 on 5' run; upper break point of core matches lower break point of R27 R28: 13 minutes
340							



PROJECT NUMBER:

338884.FL

BORING NUMBER:

AD-04

SHEET 8 OF 16

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER	LEVELS : 5.8	8 ft b	gs on 9	D7 LOGGER : R. Bitely, J. Townes,	S. Roberti, K. Waikins		
> n ::	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	E RU STH.,	(%) Q	TUR 100-	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	3OLI(	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT SURF	SORE ENG RECC	RQD	RAC ER I	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-297.4	016	ш	шш		0,	Limestone	
-			>10	-	F	<ul> <li>339.0-343.8' - yellowish gray, (5Y</li> </ul>	-
_	R29-HQ			-	Ħ	7/2), medium grained, mild to moderate HCl reaction, extremely	-
-	5 ft 96%	0	>10	-	世	<ul> <li>weak to very weak (R0 to R1), voids 1/32-1/16" throughout; friable</li> </ul>	-
_	9076			-	L		-
-			>10	342.4' - Fracture, smooth, undulating, brown organic staining, tight, ~1/8" thick	H	_	1
_			>10	organic staining, tight, ~1/6 thick	H	-	R29: 15 minutes
_	344.0			-	H	No December 242 0 244 0	1
			NR_	-	口	<ul> <li>No Recovery 343.8-344.0'</li> <li>Limestone</li> </ul>	1
345			1	344.7' - Mechanical break or bedding plane,	世	344.0-348.8' - light bluish gray with — medium bluish gray mottling, (5B 7/1	1
-302.4			>10	10 deg, smooth, undulating, 1/16" relief	$\perp$	with 5B 5/1), very fine grained, strong	]
			10	345.0-345.7' - Fracture zone, large angular, brittle limestone	Ь	HCl reaction, very weak (R1), clayey, voids (bioturbation); otherwise <1%	]
_	R30-HQ 5 ft	75	1	_	H	voids	
_	96%	, ,		346.6' - Mechanical break, rough, planar,	F	_	
_			1	along bedding plane 347.0' - Fracture, horizontal, rough,	Ħ	=	SC-6 Collected at 347.0- 347.9' -
_				undulating, 3/16" relief	Ħ	-	D20: 40 minutes
_			1	348.0, 348.8' - Fractures or bedding plane (2), horizontal, rough	L	_	R30: 10 minutes
_	349.0		NR		H	- No Recovery 348.8-349.0	-
			1	349.1, 350.0, 351.5, 351.7, 352.0, 352.2, 352.3, 352.8' - Bedding plane (8), horizontal,	⊬	Limestone 349.0-353.5' - bluish white with light	-
350 <u> </u>				smooth, undulating, tight to 1/4" open, — bedding planes	₽	<ul> <li>bluish gray mottling, (5B 9/1 with 5 B 7/1), very fine grained, strong HCl</li> </ul>	
-			1	349.8, 349.9' - Fractures (2), 60 deg, smooth,	口	reaction, very weak to weak (R1 to	-
-	R31-HQ			undulating, tight 350.35' - Mechanical break, <5 deg, rough,	口	R2), friable, <1% visible voids	-
_	5 ft 96%	42	>10	stepped, tight 351.0-351.5' - Fracture zone	仜	-	1
-	3070		_	351.0-351.5 - Fracture zone 352.2' - Fracture, vertical, smooth,	世	-	1
_			5	undulating, 1.1' long fracture, tight			1
			1	_	⊣		R31: 8 minutes
	354.0		NR	353.5' - Mechanical break, <5 deg, rough, undulating, tight	Ė	No Recovery 353.5-354.0	]
			1	353.6' - Fracture, vertical, smooth,	广	_	]
355_				undulating, 4" long fracture, tight 354.8' - Fractures (2), 40 deg, smooth, —	Ħ	_	
-312.4			3	undulating, two intersecting fractures, tight	Ë	-	
-	Dog L/O			354.9' - Fractures (2), vertical, smooth, undulating, two 2-7/16" fractures, tight	片	Limestone	
-	R32-HQ 5 ft	48	>10	355.05, 355.55, 355.8, 355.91, 356.05, 356.2, 357.85' - Bedding plane (7), horizontal,	낟	355.7-356.5' - yellowish gray, (5Y - 8/1), medium grained, moderate to	-
-	100%			smooth, planar to undulating, tight to 1/4"	$\vdash$	strong HCl reaction, weak (R2), abundantly fossiliferous, primarily	-
-			2	open 356.2-357.2' - Fracture zone, fragments, 3"	F	foraminiferous <1/32" molded voids	-
-				diameter	匚	(forams) throughout; brown organic silt partings	R32: 10 minutes
-	359.0		1	358.2' - Fractures (2), 10 deg and 40 deg, rough, undulating, broken up there, force not	口	- 356.5-359.0' - Same as 349.0-355.7' except bluish white to yellowish gray,	-
-				tight, broken at 1" fossil cast	口	(5B 9/1 to 5Y 8/1), scarce	-
360			2	359.2' - Fracture, 60 deg, smooth, undulating, tight to 1/4" open, 4-3/16" long	$\Box$	<ul><li>bioturbation</li></ul>	
300							
					L		



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER	LEVELS : 5.8	88 ft b	gs on 9	9/13/07 START: 9/6/2007 END	: 9/27/20	LOGGER : R. Bitely, J. Town	es, S. Roberti, K. Waikins
≥0₽	(%)			DISCONTINUITIES	ე	LITHOLOGY	COMMENTS
ELO N (f	JN, ANE 3Y (%	_	ZES T	DESCRIPTION		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	a Q	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNE	ss X	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-317.4				359.9, 360.2, 360.45, 360.6, 362.15, 362.35,		Limestone	
_			>10	362.55, 362.65, 363.45' - Bedding plane (9), horizontal, smooth, undulating, tight to 1/4"	╆	- 359.0-365.5' - yellowish gray, (5Y 7/2), medium grained, mild to	1
	R33-HQ		>10	open 360.6-360.95, 361.25-362.15, 362.55-362.65	. Ъ	moderate HCl reaction, very weak to weak (R1 to R2), moderately to	1
	5 ft 100%	50	/10	- Fracture zone (3), fragments 3" diameter	Ъ	abundantly fossiliferous, forams,	
_			>10		$\perp$	pelecypods, bryozoa; <1/32" voids - and foraminiferous molds ~ 50%	
_			- 10		F	bioturbated and finer grained, 359.0	
_			2		井	to 360.2' and 363.0 to 365.5'	R33: 12 minutes
_	364.0			363.75' - Fracture, vertical, smooth,	井	- -	-
_			2	undulating, 6" long, tight	+	1	-
365 <u> </u>				364.6, 365.6, 364.9, 366.0' - Bedding plane (4), horizontal, smooth, undulating, tight to	土	<u> </u>	-
-			2	1/4" open 365.0' - Fracture or mechanical break, 20	$\pm$	Limestone	
_	R34-HQ			deg, rough, undulating, open, fragment	╁	- 365.5-366.8' - yellowish gray, (5Y	-
-	5 ft 100%	60	1	missing 365.4' - Fracture or mechanical break, 30	$\Box$	<ul> <li>8/1), fine grained, mild to moderate</li> <li>HCl reaction, weak (R2), friable, silty</li> </ul>	,   -
_	100 /6			deg, rough, undulating to stepped, missing	+	voids over <5% 366.8-367.7' - pale yellow gray to	SC-7 Collected at 366.8 367.7'
-			1	fragments, tight to 1" open 366.5-366.8' - Fracture zone, fragments to	T	very light gray, (5Y 7/2 to N8), weak	1
-				1-2" 368.05-368.6' - Fracture zone, fragments to	世	- to medium strong (R2 to R3), >50% bioturbated with voids over 60% of	R34: 12 minutes
	369.0		2	2-3" rock weakened by fossiliferous zone	Ъ	sample, abundantly fossiliferous 367.7-369.0' - yellowish gray, (5Y	1
			4	369.2' - Bedding plane, horizontal,	Ъ	7/2), very fine to fine grained, mild to	
370			_	moderately smooth, planar, 1/16-3/16" open (typ)	山	moderate HCl reaction, abundantly fossiliferous (pelecypods, forams)	
-327.4			3	369.4, 369.6, 369.8, 370.1, 370.3' - Bedding		voids, molds up to 1/16" >50% bioturbated	_
_	505.110			plane (5), horizontal, moderately smooth, planar, 1/16-3/16" open (typ)	F	_ 369.0-370.3' - yellowish gray, (5Y	-
_	R35-HQ 5 ft	35	3	370.3-370.7' - Fracture zone, lithology	$\perp$	7/2), fine to medium fine grained, mild HCl reaction, very weak to weal	.   -
_	88%			change 371.1' - Fracture, rough, undulating, 9/16"	$\pm$	(R1 to R2), <1/32" voids (primarily	`   -
_			1	relief, break across void 371.5, 371.8, 371.9, 373.0' - Bedding plane	+	foraminifera molds), friable, silty 370.3-373.7' - very light gray, (N8),	-
-				(4), 0-10 deg, rough, undulating, 3/16-3/4"	廿	<ul> <li>with &lt;5% light bluish gray mottling, moderate to strong HCl reaction,</li> </ul>	-
-	274.0		NR	open		abundantly fossiliferous (primarily	
-	374.0				$\perp$	foraminifera), molds <1/32-3/16", >50% bioturbated	R35: 12 minutes
375			2	374.3, 374.6, 375.1' - Fractures (3), horizontal, rough, undulating, 3/16-9/16" oper	, <del> </del>	No Recovery 373.7-374.0' Limestone	
-332.4			>10	, 0, 1111 0, 1111 11	丁	374.0-374.9' - yellowish gray, (5Y	Driller's Remark: Hard
	R36-HQ			375.5-376.8' - fragments, silty limestone	丁	<ul> <li>8/1), strong HCl reaction, very weak to weak (R1 to R2), voids to 3/16";</li> </ul>	rocks lodged in inner core, - only advanced 4'
	4 ft 70%	10	>10		力	friable and very weak rock (R1)rock at 374.0-374.3'	]
					上	374.9-376.8' - yellowish gray, (5Y	
] _			NR		上	8/1), strong HCl reaction, weak (R2) friable, as at 374-374.3' above, but	R36: 15 minutes
_	378.0				$\vdash$	with occasional olive gray organic	
_			1		F	streaks No Recovery 376.8-378.0'	
_				378.6, 379.3' - Fractures (2), horizontal, rough, undulating, poorly fit 3/16-9/16" open	井	1	
-			2	122g., and alam, g, poorly in 6, 10 6, 10 open	片	1	
380					-		



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER	LEVELS : 5.8	88 ft b	gs on 9	9/13/07 START: 9/6/2007 END: 9/	27/20	D7 LOGGER: R. Bitely, J. Townes,	S. Roberti, K. Waikins
≥o.⊋	<u>(</u>			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-337.4 - - - - -	R37-HQ 6 ft 78%	39	3 >10 >10	379.6, 380.0, 380.1, 380.2, 380.7' - Bedding plane (5), horizontal, tightly fill 1/16-3/16" relief 380.9-382.7' - Fracture zone		Limestone  378.0-379.5' - very light gray, (N8), very fine grained, moderate HCl reaction, weak (R2), >50% voids  - <1/32" wide and bioturbated 379.5-382.6' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), friable, silty, voids <1/32", well	
385	384.0		NR >10	384.0-384.3' - Fracture zone, fragments to 4"x2" 384.3, 384.5, 384.8, 385.3, 387.85' - Bedding		distributed but <5%  382.6-382.9' - pale yellowish gray, (5Y 8/1), strong HCl reaction, weak to medium strong (R2 to R3), bioturbated, voids 1/8" wide No Recovery 382.9-384.0'	R37: 16 minutes
-342.4  - -	R38-HQ 5 ft 100%	55	3	plane (5), 0-5 deg, smooth, undulating, tight to 1/2" open 385.5' - Fracture, rough, undulating, 4-3/16" void 385.65' - Mechanical break, <5 deg, rough, undulating, tight		Limestone  384.0-385.7' - Same as 379.5-382.6' except 3/8" single very extensive void across sample 385.2-385.7'  385.7-388.5' - Same as 384.0-385.7'	
- - -			2 >10	387.5' - Mechanical break, 20 deg, rough, undulating, tight 388.4-388.8' - Fracture zone, fragments to		- - - 388.5-390.0' - light gray, (N7), fine to	R38: 10 minutes
390 -347.4	389.0		2 0 >10	2"x2"  389.4' - Fracture, 80 deg, rough, undulating, open, missing face 389.6' - Mechanical break, <5 deg, rough, undulating, tight		- medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), hard, abundant voids - <1/32-1/8" throughout, primarily foraminiferous	_
- - -	R39-HQ 5 ft 100%	0	>10	389.8' - Bedding plane, horizontal, smooth, planar to undulating 389.9-394.0' - Fracture zone, some brown organic staining on fractures, various fragments of all orientation within limestone; mechanical		Clay (CL) 390.0-390.3' - soft, calcareous with dark brown orange silt Limestone 390.3-394.0' - yellowish gray, (5Y 7/2), moderate HCl reaction, very	
-	394.0		>10			weak to weak (R1 to R2), friable, organic staining within many fractures <1/32-3/16" voids	R39: 10 minutes
39 <u>5</u> -352.4			3 >10	394.2, 394.3, 394.5, 394.9' - Mechanical break or bedding plane (4), horizontal and 10 deg, rough, undulating, organic staining at 394.5', 3/16 to 3/8" relief		394.0-399.0' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCI reaction, very weak to weak (R1 to R2), voids <1/32-3/16" (molds and casts) 394.0-395.0' bioturbated	_
- - -	R40-HQ 5 ft 90%	53	2	395.3-395.8' - Fracture zone, 3/4 to 1-1/2" blocky fragments  396.4, 396.9' - Mechanical break (2), horizontal, rough, undulating, 1-3/16" relief		- - -	
- - -	200.0		0 0 NR			- - - No Recovery 398.5-399.0'	R40: 9 minutes
400	399.0		3	399.3, 399.7, 400.1' - Bedding plane (3), horizontal, smooth		-	



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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT: Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 9/6/2007 END: 9/27/2007 LOGGER: R. Bitely, J. Townes, S. Roberti, K. Waikins DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD SYMBOLIC RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -357.4 Limestone 400.1-400.3' - Fracture zone 2 399.0-404.0' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, very weak to weak (R1 R41-HO 401.1' - Fracture, 30 deg, rough, 3/16-9/16" 2 to R2), mold and casts over 20% of 53 5 ft relief, mechanical 96% rock, foraminifera. gastropods, 401.7, 402.1, 402.4, 402.6, 403.2' - Fractures pelycypods, bioturbated 400.0-401.0' (5), 0-20 deg, planar, tight 2 R41: 9 minutes 3 Finished at 15:15 on 404 0 NR No Recovery 403.8-404.0' 9/20/07 404.1, 404.3, 404.5, 404.6, 404.8, 405.3, Limestone 5 405.7' - Mechanical break (7), horizontal and 404.0-409.0' - Same as 399.0-404.0' Started at 07:30 on 9/21/07 405 30 deg, rough, planar to undulating, poorly fit, except molds and casts 1/16-3/16' -362.4 >9/16" open between 405.0-407.0' 3 406.0, 406.5, 406.8' - Mechanical break (3), R42-HQ 2 0-20 deg, rough, undulating, tightly fit to 3/8" 5 ft 40 99% 1 407.5, 408.2' - Mechanical break (2), 30 deg, very rough, planar, tightly fit R42: 11 minutes 3 408.5-408.8' - Mechanical break, vertical 409.0 NR 408.9' - Mechanical break, horizontal, planar No Recovery 408.95-409.0' to undulating 409.1, 409.2' - Mechanical break (2), 409.0-411.3' - light yellowish gray, 2 (5Y 9/1), fine grained, moderate HCI 410 horizontal, smooth, undulating, poorly fit 367.4 reaction, very weak (R1), voids to 410.3' - Mechanical break, horizontal, very 1/4", fine black needle form mineral 2 rough, stepped, tightly fit, 3/4" relief throughout 5% (possibly phosphate 410.7' - Fracture, 30 deg, smooth, planar, or organic) R43-HQ 1/16" open Clay (CL) 27 0 5 ft 411.1, 411.3' - Mechanical break (2), 411.3-411.7' - light gray calcareous 80% horizontal, very poorly fill, 1-3/16" open silty clay 3 411.6-411.9' - Fracture zone, through Limestone consolidated limestone 411.7-413.0' - Same as 409.0-411.3' 412.2' - Mechanical break, 30 deg, break except medium strong (R3) R43: 14 minutes through unconsolidated limestone NR No Recovery 413.0-414.0' 412.7, 412.8' - Mechanical break (2), 414.0 Limestone 414.25, 414.4' - Mechanical break (2), planar 5 414.0-416.5' - yellowish gray, (5Y to undulating, poorly fit 414.6' - Fracture, horizontal, undulating, 8/1), moderate HCl reaction, medium 415 -372.4 strong (R3), finely crystalline; poorly fit with (Mt) oxide staining evident 415.0-416.5' medium strong (R3); 1 415.0' - Fracture, 40 deg, discontinuity 414.0-415.0' very weak; 414.7-414.9' between hard fossiliferous limestone and very weak (R1), dark brown organics R44-HQ dark organic silt clay 1 50 5 ft 415.7, 416.5, 417.2, 417.7, 418.0, 418.3' -416.5-418.7' - yellowish gray, (5Y 96% 8/1), fine grained, very weak to weak Mechanical break (6), horizontal, planar (R1 to R2), >5% fossiliferous casts 3 and molds (foraminifera, echinoderma, pelycypods, R44: 13 minutes 2 gastropods), occasional black mineral growth in voids, very soft, NR 419.0 418.7' - Fracture, horizontal, rough, planar, voids <1/32-3/16" 0 contact: hard fossiliferous limestone over Clayey Silt (ML) dark brown silty clay. mt oxide staining on 2 418.7-418.8 - greenish black 420 limestone surface



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER	LEVELS : 5.8	8 ft bo	gs on 9		/27/200		
žQ£			1	DISCONTINUITIES	8	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-377.4 - -	R45-HQ		0	419.3' - Bedding plane, 10 deg, contact: black orange clayey silt over limestone, unbroken 419.9' - Mechanical break, horizontal, rough,		No Recovery 418.8-419.0' Clayey Silt (ML) 419.0-419.2' - greenish black, organic	
-	5 ft 100%	61	3	planar, 3/8" relief, 1/16" open, tight 421.5' - Bedding plane, horizontal, undulating, horizontal undulating break along		Limestone 419.2-421.5' - yellowish gray, (5Y 8/1), weak (R2), >5% casts and	
-			1	bedding, <1/16" infill (organic) 421.8-422.3' - Mechanical break, vertical 422.8' - Bedding plane, smooth, undulating, break along bedding, tight fit, organic staining		<ul> <li>molds (foraminiferons, tortella,</li> <li>pelycypods), voids of various size</li> <li>throughout</li> <li>421.5-423.0' - pale yellowish brown,</li> </ul>	R45: No Time Recorded
-	424.0		1	break along bedoing, light hi, organic staining		(10YR 6/2), very fine grained, strong HCl reaction, weak (R2)  423.0-424.5' - pale yellowish brown,	Bit drops at 424.5'
42 <u>5</u> -382.4 -			NA >10	-		(10YR 6/2), very dense, mild to moderate HCl reaction, very strong (R5), crystalline, <1/32" voids throughout	
-	R46-HQ 5 ft 58%	12	>10			Clay (CL) 424.5-425.2' - brownish gray, soft, carbonate	
-			NR			Limestone  425.2-427.0' - light olive gray, (5Y 6/1), strong HCl reaction, very weak to weak (R1 to R2), limestone fragments	Various bit drops between 427-429' (void depths unknown) R46: 15 minutes
- - 430	429.0		4	429.2, 429.5, 429.8, 429.9, 430.0' - Fractures (5), 10-30 deg, planar, tight, 1/16-1/16" relief,	H	No Recovery 427.0-429.0' Limestone 429.0-433.0' - light yellowish gray, (5Y 9/1), dense, strong HCl reaction,	
-387 <u>.4</u> - -	R47-HQ		1	thin organic silty infill <1/32" - 430.0-432.5' - Mechanical break, horizontal, smooth, planar, tight to 1/8" open		medium strong (R3), microcrystalline, no visible voids, medium strong (can be carved with a knife) organic, silty bedding planes,	
-	5 ft 78%	27	3			last 4" very soft and clayey	
-			NR	432.7' - Fracture, rough, undulating break, disconformity, limestone over friable organic silt		No Recovery 433.0-434.0'	R47: 15 minutes
- - 435	434.0		NA			Clayey Silt/ Silt (ML)  - 434.0-435.4' - greenish black, (5GY 2/1), organic soft	SC-8S Collected at 434.0- 435.4' (soft soil sample)
-392 <u>.4</u> - -	R48-HQ 4 ft	0	NA 0	435.4-438.0' - Fracture zone, hard limestone with angular fragments		Peat/organics 435.4-435.9' - greenish black, (5GY / 2/1), moderate HCl reaction,	
-	100%		>10			extremely weak to very weak (R0 to R1), >50% organic material	R48: 16 minutes
- -	438.0		>10 1	438.5' - Mechanical break, horizontal, rough,		435.9-438.0' - grayish orange, (10YR 7/4), fine grained, strong HCl reaction, very weak to weak (R1 to R2)	SC-9 Collected at 438.5-
- - 440			>10	undulating, 3/16" open		- -	439.4'
							_



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SHEET 13 OF 16

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

CORING METHOD AND EQUIPMENT: Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 5.88 ft bgs on 9/13/07 START: 9/6/2007 END: 9/27/2007 LOGGER: R. Bitely, J. Townes, S. Roberti, K. Waikins DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS **DESCRIPTION** SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD  $\underline{\circ}$ RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS DROPS, TEST RESULTS, ETC. CHARACTERISTICS -397.4 438.0-439.4' - yellowish gray, (5Y 439.4-440.6' - Fracture zone, through soft >10 7/2), very fine grained, moderate HCI R49-HQ reaction, medium strong (R3), 14 6 ft abundant voids to 1/8" with some 43% voids filled with organic silt, <5% fossils, primarily molds 439.4-440.6' - dusky yellow, (5Y 6/4), NR strong HCl reaction, very weak (R1), friable silt No Recovery 440.6-444.0' R49: 18 minutes 444 0 Limestone 444.0-446.0' - moderate yellowish 2 444.5' - Fracture, 15 deg, very rough brown, (10YR 5/4), fine to very fine 445 -402.4 445.0' - Fracture, possible void grained, mild HCI reaction, very weak 1 to weak (R1 to R2), dolomite, 445.6' - Mechanical break, notched medium crystalline friables, >5% voids up to fit 1/16" open Driller's Remark: Bit drop R50-HQ 446.0' - Fracture, bit dropped, assumed void 446.0-447.8' - missing 5 ft 20 2.0 ft into run, interpreted 56% location as void NR 447.6' - Fracture, 60 deg, break across void 447.8-448.6' - dusky yellowish brown to pale yellow brown, (10YR 2/2 to 1 R50: 9 minutes 10YR 4/2), fine grained, strong HCl reaction, crystalline, calcite, large NR 449.0 449.0' - Fracture, void Driller's Remark: Void at voids to 1-1/4" with calcite rhombic top of run, 1.0' of drilling in crystals and clean hexagonal quartz 450 middle of void near bottom. crystals other voids filled with silty NR 407.4 (based on bit drop) friable dolomite No Recovery 448.6-449.0' No Recovery 449.0-451.0' R51-HQ 451.0-452.0' - Fracture zone, limestone Limestone 0 >10 (dolomite) 451.0-452.0' - pale yellowish brown, 5 ft 32% (10YR 6/2), medium strong to strong 452.0' - Fracture, void (R3 to R4), crystalline >5%, of voids (molds) voids up to 1/8", dolomite No Recovery 452.0-454.0' NR R51: No Time Recorded 454.0 454.0-456.0' - Mechanical break, large Limestone >10 angular fractures at all angles 454.0-455.9' - pale yellowish brown, 455 (10YR 6/2), fine grained, <5% voids -412<u>.4</u> to 3/16", poorly fossiliferous >10  $455.9\text{-}457.0^{\prime}$  - light olive gray to pale olive, (5Y 5/2 to 10Y 6/2), fine R52-HC 456.2, 456.3, 456.6, 456.7' - Fractures (4), 4 5 ft 76% 7 horizontal, smooth, planar to undulating, tight grained, mild HCI reaction, very weak to weak (R1 to R2), friable, silty 457.0-457.8' - Same as 454.0-455.9' 5 457.3-457.7' - shattered dolomite, large except first 3" are amber brown, angular fragment R52: No Time Recorded No Recovery 457.8-459.0' NR Finished drilling on 9/21/07 459.0 at 459.0' 459.0-459.5' - Fracture zone. 1"-3" rock >10 fragments of hard dolomite Start drilling on 9/22/07 460



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### **ROCK CORE LOG**

SHEET 14 OF 16

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER	LEVELS : 5.8	8 ft bo	gs on 9	9/13/07 START : 9/6/2007 END : 9/	27/20	D7 LOGGER: R. Bitely, J. Townes,	S. Roberti, K. Waikins
>00	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE	TH.	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ENG	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
<u>-417.4</u>	OJR	22	шФ	460.0, 462.7' - Fracture (2), 75 deg, planar,	S	Limestone	
			3	fracture through hard dolomite, 3/16" relief	岸	<ul> <li>459.0-460.2' - moderate brown to</li> </ul>	-
_	R53-HQ			460.4' - Fracture or mechanical break, 30 deg, rough, planar	世	grayish brown, (5YR 3/4 to 5YR 3/2), dense, fine to medium grained, mild	-
_	5 ft	25	>10	460.6, 460.8, 461.2, 461.3' - Bedding plane	╀	<ul> <li>HCl reaction, medium strong to</li> </ul>	-
_	100%			or mechanical break (4), horizontal, planar, 3/16" relief	$\Box$	strong (R3 to R4), crystalline, dolomite; <1/32" voids over 70% of	-
-			5	461.7-462.3' - Fracture zone, horizontal,	ш	<ul><li>surface</li></ul>	-
_				undulating, dolomite, poorly fit	ш	460.2-462.2' - fine to medium grained, mild HCl reaction, very weak	R53: 13 minutes
_			>10	463.4-463.8' - Fracture zone	$\pm$	<ul> <li>(R1), friable breaks on bedding</li> </ul>	-
-	464.0			464.0-466.3' - Fracture zone, large fragments	+	planes 462.2-464.0' - Same as 459.0-460.2'	1
			>10	of blocky to angular dolomite	Ħ	- except moderate brown to grayish	1
465 <u> </u>				_	Ħ	brown, (5YR 3/4 to 5YR 3/2), dolomite	-
-			>10	-	L	Limestone 464.0-466.5' - Same as 462.2-464.0'	-
-	R54-HQ			-	╫		1
-	5 ft 60%	0	>10	466.5' - Fracture or mechanical break, 45	F	466.5-467.0' - yellowish brown,	
_	00%			deg, across hard dolomite over friable	仜	<ul> <li>(10YR 5/4), moderate HCl reaction, friable, silty, streaks of organic</li> </ul>	
-				dolomite below, tightly fit 466.7' - Fracture, horizontal, planar, 3/16-3/8"	ш	staining on bedding	1
-			NR	relief, contact between hard dolomite and friable dolomite below	+	- No Recovery 467.0-469.0'	R54: 12 minutes
-	460.0			mable dolomite below	$\vdash$	-	1
_	469.0			469.0-470.2, 471.0-471.4' - Fracture zone	Ħ	_ Limestone	1
470			>10	(2), hard, dolomite	Ħ	<ul> <li>469.0-472.0' - moderate yellowish brown, (10YR 5/4), mild HCl reaction,</li> </ul>	1
-427.4				_	H	very weak to weak (R1 to R2), finely	
_			1	- 470.6' - Fracture, horizontal, rough, planar,	╙	<ul> <li>crystalline, dolomite, voids throughout variable 1/16-3/4"</li> </ul>	1
_	R55-HQ			break tensely fit, 9/16" relief	Ш		1
	5 ft 60%	13	>10	474.0.470.01. 5	ш	-	1
				471.8-472.0' - Fracture zone -	世	No Recovery 472.0-474.0'	1
			ND	-		_	1
			NR	_	Н	_	R55: 12 minutes
	474.0				H		1
			>10	474.0-475.1' - Fracture zone	片	Limestone	1
475_			-10	_	片	<ul> <li>474.0-478.0' - moderate yellowish brown, (10YR 5/4), mild HCl reaction,</li> </ul>	
-432.4			1		H	very weak to weak (R1 to R2), - extensive voids throughout 1/16-3/4",	
			1	475.5' - Fracture or mechanical break, 50 deg, very rough, undulating, tight	${\mathbb H}$	finely crystalline dolomite, few of the	
	R56-HQ 5 ft	27	3		尸	voids with clean hexagonal quartz crystals (1/8")	
_	80%		Ŭ	476.5' - Mechanical break, 45 deg, tightly fit 476.7' - Mechanical break, 10 deg, planar,	Ш	-	
_			>10	tight	上	_	]
_				477.3' - Mechanical break, horizontal, undulating, tight		- N. B. 4=0.0 :== -:	
_			NR	-	F	No Recovery 478.0-479.0'	R56: 14 minutes
_	479.0			470.0.470.01.5	Ħ	<u>-</u>	]
_			2	479.0-479.3' - Fracture zone, hard dolomite 479.3' - Fracture, 45 deg, rough, irregular	片	<u>-</u>	_
480				break across voids	$\vdash$	_	
Ц					1		



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SHEET 15 OF 16

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER	LEVELS : 5.8	88 ft b	gs on 9	9/13/07 START: 9/6/2007 END: 9/	27/20	D7 LOGGER : R. Bitely, J. Townes,	S. Roberti, K. Waikins
200	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU STH, OVEF	(%) <sub>Q</sub>	TUF FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURF	SORI	RO	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-437.4	034			480.0-480.3' - Fracture zone, through	0,7	Limestone	
-			2	dolomite	H	<ul> <li>479.0-481.7' - yellowish orange,</li> </ul>	-
-	l R57-HQ			480.8' - Fracture, horizontal, rough, undulating, horizontal break through voids	Ħ	(10YR 7/4), very weak to weak (R1 to R2), finely crystalline, dolomite, voids	-
-	5 ft 88%	48	6	481.0-481.4' - Fracture zone, through friable	Ħ	- throughout to 3/4"	-
-	00 /0			dolomite 481.4-481.7' - Fracture, 60 deg, through hard	Ш	481.7-483.4' - grayish orange, (10YR 7/4), dolomite with calcareous infill	SC-10 Collected at 481.7- 483.3'
-			0	dolomite	H	<ul> <li>voids; 482.6': portion of gray infilled limestone 3" thick</li> </ul>	1
-			0	481.7' - Fracture, horizontal, very rough, undulating, Mt oxide staining	H		R57: 14 minutes
-	484.0		NR		Ħ	No Recovery 483.4-484.0'	1
_	101.0			484.2-484.5' - Mechanical break, 45 deg and	世	Limestone	1
485			4	horizontal, undulating, poorly fit	Ш	<ul> <li>484.0-487.0' - yellowish gray, (5Y 7/2), moderate HCl reaction, weak to</li> </ul>	1
-442.4				_	Н	medium strong (R2 to R3), finely	
_			1	485.7' - Mechanical break, horizontal,	H	<ul> <li>crystalline dolomite, voids to &lt;1/16-3/16"; many filled with amber</li> </ul>	1
_	R58-HQ			undulating, across void, tightly fit	Ħ	calcite	1
_	5 ft 90%	38	2	486.4' - Fracture zone, irregular	H		1
_			- 10	487.0, 487.3' - Mechanical break (2),	Н	487.0-488.5' - dusky yellow, (5Y 6/4),	1
_			>10	horizontal, planar, very poorly fit across friable dolomite	Н	<ul> <li>very weak (R1), very friable, finely crystalline dolomite</li> </ul>	1
			>10	487.3-488.5' - Fracture zone, friable to unconsolidated dolomite	Ш		R58: 12 minutes
	489.0		NR	unconsolidated dolornite	Ш	No Recovery 488.5-489.0'	
			>10	489.0-489.8' - Fracture zone, large angular block, limestone fragments	Ш	Limestone - 489.0-489.3' - yellowish gray, (5Y	
490_			10	_	Н	8/1), very fine grained, very strong	
-447.4			6	490.0-490.1' - Fracture, horizontal, smooth, undulating, discontinuity with 1" white clay	H	HCl reaction, weak to medium strong (R2 to R3), <1/32" void over 10%, 1"	
_			Ľ	infill	Ħ	thick layer of soft calcareous clay	_
_	R59-HQ 5 ft	50	2	490.1, 490.3' - Mechanical break (2), horizontal, planar, poorly fit	H	489.3-493.6' - pale grayish orange to - dusky yellow, (10YR 7/4 to 5Y 6/4),	_
_	92%			490.6' - Mechanical break, 15 deg, rough,	H	fine grained, moderate HCl reaction, weak to medium strong (R2 to R3),	
_			2	planar, tightly fit 490.8-491.0' - Mechanical break, 85 deg,	H	<ul><li>&gt;8% voids throughout &lt;1/32-1/16",</li></ul>	_
-				fracture between 2 horizontal bedding plane breaks	尸	many voids with amber calcite fill, finely crystalline	R59: 14 minutes
-			0	491.7' - Mechanical break, undulating,	П	-	11.00. 14 Hilliules -
-	494.0		NR	1/16-3/16" open 492.4-492.5' - Mechanical break (2), planar,	H	No Recovery 493.6-494.0' Limestone	-
			4	3/16-5/16" open	団	<ul> <li>494.0-499.7' - grayish orange, (10YR</li> </ul>	-
495 <u>-</u> -452.4				494.4, 494.7, 494.9, 495.0' - Mechanical — break (4), 0-15 deg, rough, poorly fit —	丗	7/4), moderate HCl reaction, medium strong (R3), dolomite, weak to	-
-			3		H	<ul> <li>medium strong (R1-R2) through</li> </ul>	-
-				495.8' - Fractures (2), horizontal, light brown	Ħ	areas of bedding plane discontinuities; voids <1/32-1/8",	SC-11 Collected at 496.0-
-	R60-HQ		>10	clay infill (1"), poorly fit 495.9' - Fracture (2), horizontal, light brown	H	<ul> <li>uniformly distributed, some voids filled with amber calcite, numerous</li> </ul>	496.9'
-	6 ft	47		clay infill (1"), poorly fit	H	open voids to 1.5" with amber, calcite	-
-	95%		2	407.7.400.21 Machanizatharaharah	出	<ul> <li>crystal growth, finely crystalline</li> <li>496.0-496.9' - moderate yellowish</li> </ul>	-
-				497.7-498.3' - Mechanical break or bedding plane (4), horizontal, planar, through friable	H	brown to grayish brown, (10YR 5/4 to	-
-			4	dolomite	囯	<ul> <li>10YR 7/4), mild HCl reaction, finely crystalline dolomite, well-distributed</li> </ul>	-
-			3	498.8, 498.9, 499.0, 499.3, 499.5, 499.6' - Bedding plane (6), horizontal, poorly fit,	団	1/32-1/16" voids, some filled with	R60: 14 minutes
500 -	500.0		NR	friable dolomite	Ш	<ul> <li>crystals, black organics, white calcareous clay</li> </ul>	
300	500.0		INE				
							<u> </u>



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	AD-04	SHEET	16	OF	16	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723034.6 N, 458030.5 E (NAD83)

CORING METHOD AND EQUIPMENT : Dietrich D-120 S/N 820; BL300T S/N 1517, mud rotary, HQ tools, HW casing

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Boart Longyear, Huntsville, AL; Driller: K. Heinrich, A. Anderson

WATER L	EVELS : 5.8	88 ft bo	gs on 9	9/13/07 START : 9/6/2007	END: 9/2	7/200	DOT LOGGER: R. Bitely, J. Townes, S	
>00	(6			DISCONTINUITIES		G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ᆱᇬ	RUN H, A	(%)	IURI 001	DEPTH, TYPE, ORIENTATION, ROUGHN	ESS	SLIC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
THE EVA	NG1 CO	R Q D (%)	FRACTURES PER FOOT	l PLANARITY. INFILLING MATERIAL AN	ID I	MB(	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SS	Sas	R(	R R	THICKNESS, SURFACE STAINING, AND TIG	HTNESS	SΥ	CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
							No Recovery 499.7-500.0'	
1 7					1		Bottom of Boring at 500.0 ft bgs on 9/27/2007	1
1 7					- 1		_ 9/21/2001	1
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PROJECT NUMBER:	BORING NUMBER:	
338884.FL	B-01	SHEET 1 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723999.6 N, 457491.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

						ry, auto nammer, nvvo rous			ONIENTATION : Vertical
WATER	LEVELS	: 1.0 ft b	gs on 5/2:	3/07	START : 5/23/2007	END: 5/30/2007	LOGGE	₹ : R.	
				STANDARD		SOIL DESCRIPTION		U	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				SYMBOLIC LOG	
표실한		RECOVE	RY (ft)	120111200210		IE, USCS GROUP SYMBO		일	DEPTH OF CASING, DRILLING RATE,
H H A A			<u> </u>	011 011 011		E CONTENT, RELATIVE DI ICY, SOIL STRUCTURE, M		l BO	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#TYPE	6"-6"-6" (N)	OONOISTEN	ior, soil strict offil, iv	IIIVETIALOGT	S⊀	INSTRUMENTATION
40.8	0.0			(,	Topsoil			V1 1V	Additional equipment note: 3-7/8" tricone bit,
-	0.0			1-3-5		nish black, (5YR 2/1), mo	oist, 15% roots		split spoon Start drilling 5/23/07 at 08:15;
l -		0.9	SS-1	(8)	- \85% organic fir		/ r-		water level = 1' ft below ground surface
	1.5			. ,	Poorly Graded	d Sand (SP)			
-					\ 0.3-0.85' - very	pale orange to grayish o	orange, (10YR		_
-	-				8/2 to 10 YR 7/4	4), moist, loose, very fine roots, trace nonplastic fir	e to tine	1	-
-	-				granica, trace i	rooto, trace nonplastic iii			=
I -									<u>_</u>
-							-	1	-
-								1	-
5	5.0				De ault Corril	I Cand Wish Oils (OD OS		1,15	_
35.8				1 4 6	5.0-6.1' - pale v	d Sand With Silt (SP-SM yellowish brown to mode	) rate vellowish	III.	
1		1.1	SS-2	1-4-6 (10)	brown, (10YR 6	6/2 to 10YR 5/4), moist to	wet, loose,	Hij	
-	6.5			(10)	very fine to fine	e grained, no HĈI reactio	n, 12%	1111	_
-	0.5				\nonplastic fines	s, trace roots, silica sand	l/ ·	1	=
-							-	-	-
-								1	_
-	1						•		<del>-</del>
-									=
-								-	=
10	10.0								
30.8					Poorly Graded		da wata		
-	1	1.1	SS-3	4-9-10		le yellowish brown to mo n, (10YR 6/2 to 10YR 5/4			_
-	14.5			(19)	wet, medium d	lense to dense, fine to me	edium grained,	1	<del>-</del>
-	11.5					n, trace black minerals, s		1	-
-									_
l _							_		
-	1								_
-	1							1	-
-								1	-
-								1	_
15	15.0								
25.8					Poorly Graded	Sand With Silt (SP-SM	)		
-	1	0.8	SS-4	6-9-9	15.0-15.8' - pal	le yellowish brown to mo n, (10YR 6/2 to 10YR 5/4	derate		1
-				(18)	medium dense	e, no HCl reaction, 5% no	nplastic fines.	1	-
-	16.5				silica sand	.,	,	1	-
-								1	_
1 -							•	1	Ī
-	1							1	-
-	-							1	-
-								1	_
I -	]							1	
20									
1									



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-01	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723999.6 N, 457491.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

						y, auto nammer, nvvo roc			ONIENTATION : Vertical
WATER	LEVELS	: 1.0 ft bo	gs on 5/20	3/07 S	START : 5/23/2007	END : 5/30/2007	LOGGEF	R : R.	
200				STANDARD		SOIL DESCRIPTION		ğ	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	OOU NAME	- 11000 ODOLID 0\/A	00100	SYMBOLIC LOG	DEDTIL OF CACINIC DRILLING DATE
불병은		RECOVE	ERY (ft)		SOIL NAME MOISTLIBE	E, USCS GROUP SYMBO CONTENT, RELATIVE D	DL, COLOR, DENSITY OR	٦ ا	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
₽₽₽			#TYPE	6"-6"-6"		CY, SOIL STRUCTURE, I		ΜB	INSTRUMENTATION
밀Տ핔				(N)				Ś	
20.8	20.0				Silty Sand (SM)	<b>)</b> e yellowish brown, (10Y	D 6/2) wat		
		1.5	SS-5	2-2-2 (4)	verv loose, no h	HCl reaction, 35% nonp	lastic fines.	$\Pi\Pi$	
-	21.5			(+)	silica sand	, , , , , , , , , , , , , , , , , , , ,		1	1
-	21.0							1111	†
-							-	1	-
-							-	┨	-
-							-	-	-
-							-	1	_
_							-	1	_
l _							_		_
25	25.0								
15.8					Silty Sand (SM)		400/		
-		1.5	SS-6	1-1-1	25.0-26.5 - San fines	ne as above except 35	40% nonplastic		_
-	26.5			(2)	111100		-	1111	1
-	20.5								1
-							-	ł	-
-							-	┨	-
-							-	1	-
-							-	4	-
l -								1	_
l _							-		_
30	30.0								
10.8					Silty Sand (SM)		400/ t- l		
-		1.5	SS-7	0-1-1 (2)	plastic fines	ne as above except 35	40% non to low	1111	1
-	31.5			(2)	process misse		-	1	1
-	01.0								1
-							-	1	-
-							-	1	-
-							-	ł	-
-							-	1	-
-							-	1	_
-							-	1	_
35	35.0							<u> </u>	
5.8					Silt (ML)	e yellowish brown, (10Y	P 6/2) moist to	Ш	
1		0.5	SS-8	1-2-4 (6)	wet, low plastici	ity, rapid dilatancy, mild	to moderate		
-	36.5			(5)	HCI reaction, ve	ery thinly bedded, 5-10°	% fine to	1	]
-					medium grained	d silica sand, lens of co erial from 35.4-35.5', al	arse Learbonate	1	1
-					materials, trace	organics throughout, o	ne 1/4" thick	1	-
-					organic lense		-	1	-
-							-	1	-
-							-	1	-
-							-	1	-
-							-	-	_
40								_	
		1	1					1	



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723999.6 N, 457491.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

						ry, auto nammer, nvvo rous			ONIENTATION : Vertical
WATER	LEVELS	: 1.0 ft bo	gs on 5/23	3/07 S	START : 5/23/2007	END : 5/30/2007	LOGGE	R : R	
30≎				STANDARD PENETRATION		SOIL DESCRIPTION		چ ا	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOII NIVA	IE, USCS GROUP SYMBOL	COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
ACE VTIO		RECOVE	ERY (ft)		MOISTURE	E, USCS GROUP SYMBOL E CONTENT, RELATIVE DE	ENSITY OR	Ĭ	DRILLING FLUID LOSS, TESTS, AND
PT.			#TYPE	6"-6"-6"		ICY, SOIL STRUCTURE, M		¥₩	INSTRUMENTATION
				(N)	01 0 11	ACH 0 : (00)		ري 222	<u></u>
0.8	40.0			2-2-2		<b>With Organics (SC)</b> ve gray, (5Y 4/1), moist to	wet verv	1//	_
		1.5	SS-9	(4)	loose, very fine	e to fine grained, no HCl r	eaction.		_
	41.5			( )	organic lenses	, 16% medium plastic fine	es, fines		
					appear to be of	rganic, silica sand	/	1	1
_								1	-
-								1	-
-								1	-
-								1	-
-								4	-
-								4	-
45	45.0	0.1	00.15	FO/5	0	01)		$\downarrow$	
-4.2	45.4	0.4	SS-10	50/5 (50/5")	Organic Soil (6	<b>OL)</b> eenish black, (5GY 2/1), r	noist to wet	772	HW casing down to 45.0'
_				(55/5)	hard, very fine	to fine grained, medium p	plasticity, slow	]	_
						ICI reaction, 5-10% silica	sand		
					Clayey Sand (\$	SC) ht olive gray, (5Y 6/1), mo	nist to wet	1	
-					35% medium to	o plastic fines, silica sand	l l	1	-
-					`			1	-
-								1	-
-								1	-
-								-	-
_								4	-
50	50.0				0111 0 1 (011			<b>.</b>	
-9.2		0.9	SS-11	27-50/5	Silty Sand (SN 50.0-50.85' - m	noderate yellowish brown	to nale		_
	50.9			(77/11")	<ul> <li>yellowish browi</li> </ul>	n, (10YR 5/4 to 10YR 6/2	), moist to	111	<u> </u>
					wet, very dense	e, very fine to medium gra 15-50% nonplastic fines, a	ained, strong		
					material	+5-50% nonpiastic lines, a	an carbonate	1	
-								1	-
-								1	1
-								1	-
-								1	-
-								+	-
-								+	-
55	55.0	0.0	00 10	E0/4	Comple City / Tall			-	
-14.2	55.3	0.3	SS-12	50/4 (50/4")	Sandy Silt (ML	L <b>)</b> ht olive gray, (5Y 5/2), we	t. nonplastic	╨	┧ .
				(00, 1)	to low plasticity	y, rapid dilatancy, modera	te to strong		_
					HCI reaction, 3	80% very fine to medium sall carbonate materials	sand, 10%		
					coarse sand, a	ui carbonate materiais		1	]
-								1	-
-								1	-
-								1	-
-								+	-
-								-	-
-								4	-
60								+	



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723999.6 N, 457491.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

WATER	LEVELS	: 1.0 ft b	gs on 5/23	3/07	START: 5/23/2007 END: 5/30/2007 LOGGE	R:	: R.	Bitely
				STANDARD	SOIL DESCRIPTION	Т		COMMENTS
AND Z	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		1	CO	
ACE TOI		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	ı	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	١	SYMBOLIC LOG	INSTRUMENTATION
-19.2	60.0			(14)	Sandy Silt (ML)	$^{\dagger}$	Ĭ	There is no distinct boundary between the
-		1.5	SS-13	32-15-10	60.0-60.8' - light olive gray, (5Y 5/2), wet, nonplastic, rapid dilatancy, mild to moderate HCl reaction,	1	Щ	subunits; boundary is gradational -
-	61.5			(25)	\30-40% fine to coarse sand, all carbonate /	1		-
-					Silty Sand (SM)  60.8-61.5' - light plive gray (5Y.5/2), wet, medium	Ť		_
					60.8-61.5' - light olive gray, (5Y 5/2), wet, medium dense, mild to moderate HCl reaction, 40% nonplastic fines, limestone lenses up to 1/4"-1/2" thick, all	]		
_					carbonate	1		_
-						1		_
-						┨		-
						+		-
65 <u> </u>	<u>65</u> .9	0.0	SS-14	50/0.25	│ Limestone Fragments	╪	_	Driller's Remark: Hit rock at 65.0'
-				(50/0.25")	65.0-65.1' - light olive gray, (5Y 5/2), mild to moderate HCI reaction, fine gravel-size fragments	1		-
-					From reaction, line graver size magnitude	1		=
						1		
						]		
_						1		_
-						1		_
-						┨		-
	70.0					┨		-
70 <u> </u>	70.0	0.0	SS-15	50/1	No Recovery 70.0-70.1'	Ŧ		10:00 Began rock coring; water level at 2.3' — /below ground surface
-				(50/1")	Begin Rock Coring at 70.0 ft bgs See the next sheet for the rock core log	1		below ground surface
-					coo are more chost for are rook core log	1		-
-						1		-
						]		
_						1		_
-						1		_
-						$\frac{1}{2}$		-
						┨		-
75 <u> </u>					-	+		-
-						$\dagger$		-
-						1		-
-						1		-
						]		
] -						]		
-						1		_
-						1		-
-						$\frac{1}{2}$		-
80						+		



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723999.6 N, 457491.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

00.110			<u> </u>	TENT . CIVIE 33 3/N 299203, HILLO TOLATY, INC. LOOIS, HWY C	aonig		ORIENTATION : Vertical
WATER	LEVELS: 1.0	ft bg	s on 5		30/20		
>				DISCONTINUITIES	ڻ ا	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표원한	L, A	<u>@</u>	FRACTURES PER FOOT		吕	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
H A A	GT S	(%) <sub>Q</sub>	FOL	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BO	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
P R H	E E S	Ø	RA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Σ	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
		ď	шп		S		
-29.2	70.0		>10	70.3' - Fracture, 65 deg, rough, undulating,	$\vdash$	Limestone  - 70.0-71.95' - moderate olive brown,	
			/10	tight, open <1/8"		(5Y 4/4), fine grained, moderate to	1
_				70.35-70.6' - Fracture zone, very fine to	╁	strong HCl reaction, weak (R2),	-
_			1	coarse gravel sized fragments	╀	<ul><li>voids (1/16") over 25% of surface,</li></ul>	SC-1 collected at 71.15- 71.95'
				70.65-70.85' - Bedding plane, <10 deg,		trace fossil molds, largest 1/4"x1/2",	
	R1-NQ			smooth, undulating, tight to 1/4" open 71.1' - Fracture or mechanical break, rough,		trace secondary recrystallization in	Driller's Remark: Soft from
	5 ft 39%	17		undulating, tight	┰	<ul><li>voids</li><li>No Recovery 71.95-75.0'</li></ul>	72.0-74.0'
_	3970			and diaming, agric	仜	THO RECOVERY 7 1.30-7 3.0	-
_			NR		┵	-	-
					┵		_
					ш		R1: 3 minutes
75	75.0				$\top$	<u> </u>	1
75 <u> </u>	75.0					Limestone	-
			>10		₽	- 75.0-75.9' - moderate olive brown to	-
				75.5-75.9' - Fracture zone	Ь	light olive gray, (5Y 4/4 to 5Y 2/2),	]
						fine grained, moderate HCl reaction,	
_			6	76.4, 76.55, 76.7, 76.9, 76.95' - Bedding	╁┷	<ul> <li>weak (R2), voids (&lt;1/16") over</li> <li>15-20% of surface, secondary</li> </ul>	Driller's Remark: Soft from
-	R2-NQ			plane (3), <10 deg, rough, undulating to stepped, open <1/2"	仜	recrystallization in voids trace casts	76.5-77.0'
_	5 ft	10	4	76.8-76.9' - Fracture zone	$\bot$	- 75.9-78.2' - moderate olive brown to	-
	64%			77.25, 77.1, 77.6, 77.9' - Bedding plane or		light olive gray, (5Y 4/4 to 5Y 2/2),	
			1	mechanical break (4), <10 deg, rough,	ш	fine to coarse grained, strong HCI	1
_				undulating to stepped, open <1/2"	╁	<ul> <li>reaction, weak (R2), voids (&lt;1/16") over 40% of surface, trace secondary</li> </ul>	1
-			NR	78.1-78.2 - Fracture zone	╁	recrystallization, trace fossil casts up	R2: 5 minutes
_					$\perp$	to 1/2" diameter	KZ. 5 minutes
80	80.0				$\vdash$	No Recovery 78.2-80.0'	
-39.2				80.15, 80.3, 80.4, 80.55, 80.75, 81.05, 81.35'		Limestone	Driller's Remark: No
_			5	- Bedding plane or mechanical break (7), <10	╙	- 80.0-84.2' - moderate olive brown,	circulation at 80'
-				deg, smooth, undulating, open <1/2"	$\pm \Box$	(5Y 4/4), fine to medium grained, strong HCl reaction, very weak (R1),	-
_			2	81.05' - Bedding plane or mechanical break,		except from 82.5-82.8' where	SC-2 collected at 81.35-
			-	30 deg, smooth, undulating, open <1/8"	$\vdash$	secondary calcite crystals in voids	82.35'
	R3-NQ				Ш	(<1/16") exists, medium strong (R3),	1
_	5 ft	38	2	82.35-82.4' - Mechanical break	╁	- voids (<1/16") over 50% of surface,	1
-	84%			82.4' - Bedding plane or mechanical break,	╂╫	many cavities, highly fossiliferous (fossils/molds)	-
			>10	10 deg, rough, undulating, tight 82.4-82.7' - Mechanical break	Ш	-	]
			``	82.7-84.2' - Fracture zone	$\vdash$		
]			>10		Ľ	No Recovery 84.2-85.0'	R3: 6 minutes
	05.0		NR		ш	_ 140 Necovery 04.2-00.0	1
85 <u> </u>	85.0				+	Limestone	-
			3	85.1' - Bedding plane or mechanical break, 10 deg, rough, fine gravel with clayey silt		- 85.0-87.2' - moderate olive brown,	1
				infill, open (large)	$\mathbb{H}$	(5Y 4/4), except two zones:	
				85.35, 86.0, 86.85, 86.95' - Bedding plane or		85.0-85.1' and 86.1-86.3' of clayey	Driller's Remark: 86-87'
-			>10	mechanical break (4), <10 deg, rough,	+	- silt, pale greenish yellow, (10Y 8/2),	silty clay -
-	R4-NQ		1	undulating, no infill, open <1/2"	++	moist, strong HCl reaction, extremely weak (R0)	Driller's Remark: Still no
-	5 ft	18	$\vdash$	85.9' - Bedding plane or mechanical break, 50 deg, smooth, undulating, tight	$\blacksquare$	- No Recovery 87.2-90.0'	circulation –
	44%	-		86.0-86.4' - Fracture zone, clayey silt infill	$\mathbf{H}$	_	
1 7				87.1' - Bedding plane or mechanical break,			1
-			NR	50 deg, smooth, undulating, open <1/8"	口	-	-
-					+	-	R4: 4 minutes
-						-	1.7. 4 Hilliutes
90	90.0				$oldsymbol{oldsymbol{eta}}$		
					_		_



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723999.6 N, 457491.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER LEVELS: 1.0 ft bgs on 5/23/0			s on 5/	23/07 START : 5/23/2007 END : 5	D : 5/30/2007 LOGGER : R. Bitely				
≥∩≘	(%)			DISCONTINUITIES	g		LITHOLOGY	COMMENTS	
N (#	AND ≪∀ND		SES T	DESCRIPTION	] S		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG		MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.	
-49.2			>10	90.2' - Bedding plane or mechanical break,	上	ŧ	Limestone 90.0-90.4' - yellowish gray, (5Y 8/1),		
_			-10	<10 deg, smooth, undulating, open <1/2" 90.4-90.8, 91.3-91.45' - Fracture zone (2),	耳	1	moderate HCl reaction, weak (R2),	_	
-			1	fine to coarse gravel sized fragments	耳	‡	voids (<1/16") over 5% of surface, trace fossil molds/cavities	-	
-	DE NO		0		扛	‡	<b>Limestone</b> 90.4-92.3' - moderate olive brown.	Driller's Remark: 92.0-93.0'	
-	R5-NQ 5 ft	29			世	‡	(5Y 4/4), strong HCl reaction, weak	silty clay	
-	46%				世	╬	(R2), voids (1/16") over 40% of surface, fossil molds	-	
-			NR		士	‡	No Recovery 92.3-95.0'	-	
-					世	╁		Driller's Remark: 94-94.5'	
95	95.0				╆	╁		possible voids - R5: 5 minutes	
-54.2	00.0		>10	95.0-95.1, 95.4-95.7' - Fracture zone (2), fine to coarse gravel sized fragments	Ъ		Limestone		
			>10	95.7-96.0' - Fracture, vertical, smooth,	$\perp$	$oldsymbol{\mathbb{I}}$	95.0-96.5' - yellowish gray, (5Y 7/2), strong HCl reaction, extremely weak		
_			5	undulating, fragmented rock on one side of fracture	$\perp$	$\perp$	(R0), voids (1/16") over 40% of surface from 95.0-96.1' and 25% of	Driller's Remark: 96.0-99.0' very soft clay -	
-	BO NO			96.0, 96.1, 96.4, 96.55' - Bedding plane or	4	-	surface from 96.1-96.5', few cavities, / few small (<1/4") fossils	-	
-	R6-NQ 5 ft	0		mechanical break (4), <10 deg, smooth, planar to undulating, open <1/2"	4	ŀ	Silt (ML)	-	
-	38%				-	ŀ	96.5-96.9' - carbonate material <b>No Recovery 96.9-100.0'</b>	-	
-			NR		-	ŀ	no necestary colo recis	-	
-					-	╟		R6: 3 minutes	
100	100.0				1	╟		-	
-59.2	100.0		_	-	ፗ	1	Limestone	_	
			2	100.6, 100.7, 100.8' - Mechanical break (3),	ፗ	1	100.0-104.35' - grayish yellow to yellowish gray, (5Y 8/4 to 5Y 7/2),	_	
			5	<10- 50 deg, smooth, undulating, tight 101.3, 101.4,101.5, 101.55, 101.6' -	上	1	fine to medium grained, strong HCl reaction, very weak (R1), trace	_	
-				Mechanical break (5), <10 deg, smooth,	ഥ	1	coarse grained material, voids (<	_	
-	R7-NQ 5 ft	32	6	planar to undulating, tight to open <1/8" 102.2-102.3' - Fracture zone, very fine to fine	上	‡	1/16") over 40% of surface, abundant cavities/fossil molds, few fossils,	-	
-	87%			gravel sized fragments 102.5, 102.75, 103.0, 103.1, 103.35, 103.55,	士	╁	trace black organics material	-	
-	-		5	103.6, 103.85' - Mechanical break (8), <10 deg, smooth, planar to undulating, tight to	士	╁		-	
-			1	open <1/8"	╁	ł		R7: 5 minutes	
105	105.0		NR	104.1-104.35' - Fracture zone, coarse gravel	+	╁	No Recovery 104.35-105.0'	-	
-64.2	.00.0			– 105.15-106.8' - Bedding plane or mechanical	$\vdash$	t	Limestone		
	]		3	break, <10 deg, rough, undulating, open <1/2"	开	Ī	105.0-106.5' - light olive gray, (5Y 6/1), fine to medium grained, strong		
1 -	]		>10	106.6' - Fracture zone, fine to coarse gravel	厈	1	HCl reaction, very weak (R1), trace coarse-sized material, voids (< 1/16")	Driller's Remark: 106.0- 107.5' soft, probably sand -	
-			. 10		井	1	over 40% of surface, abundant		
-	R8-NQ 5 ft	20	0		井	1	cavities/fossil molds, few fossils, trace black organics material	-	
-	51%				丰	‡	106.5-107.55' - Same as 105.0-106.5' except grayish yellow,	=	
-			NID		븎	+	(5Y 8/4)	-	
-			NR		岸	‡	No Recovery 107.55-110.0'	R8: 4 minutes	
110	110.0				#	†		-	
110	110.0				1	T			
					1				



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-01	SHEET	7	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723999.6 N, 457491.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

				TENT . CIVIE 33 3/IN 299203, ITINU TOTALLY, INQ TOOLS, HWY C			ORIENTATION : Vertical
WATER	LEVELS : 1.0	ft bg	s on 5		30/20		
200	(9)			DISCONTINUITIES	Ö	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표원인	KUN H, A ER,	<u>@</u>	FRACTURES PER FOOT		음	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
H A A	GTF GOV	(%) □	FOL	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BO	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
P R H	EN	Ø	RA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Σ	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	0 1 12	ľ	шп		S		
-69.2			>10		Ш	Limestone	
			/10	110.5' - Mechanical break, 60 deg, smooth,		<ul> <li>110.0-114.2' - yellowish gray, (5Y 8/1), fine to medium grained, strong</li> </ul>	
_				undulating, tight	╙	HCl reaction, very weak (R1), voids	-
_			7	110.7, 110.9-111.1, 111.3, 111.35, 111.55' - Bedding plane or mechanical break (5), <10	╀	<ul> <li>(&lt;1/16") over 40% of surface, few</li> </ul>	_
				deg, smooth, planar to undulating, open <1/8" -		cavities, fossil molds	_
	R9-NQ		_	111.1-111.35' - Fracture (2), 80 deg, smooth,	$\vdash$		
_	5 ft	20	5	undulating, tight	╙	-	_
_	84%			112.4, 112.45' - Mechanical break (2), <15		-	-
_			6	deg, undulating, smooth to rough, open <1/2"	┢	<del>-</del>	_
				112.75-112.85' - Fracture zone 113.3, 113.45, 113.7, 113.8' - Bedding plane	Н		
			_1_	or mechanical break (4), <15 deg, undulating,		No Recovery 114.2-115.0'	R9: 4 minutes
			NR	smooth to rough, open <1/2", gray/black	╁	No Recovery 114.2-115.0	-
	115.0		<u> </u>	staining on rock core and fracture surface —	╀	L:	-
-74.2			2	from 112.8-113.6',	$\Box$	Limestone - 115.0-117.8' - yellowish gray, (5Y	]
			-	113.8-114.2' - Fracture zone	$\vdash$	8/1), fine to medium grained, strong	
_				115.2-115.4' - Fracture zone, sand- to gravel-size fragments	╁	HCl reaction, very weak (R1),	-
-			3	115.75, 116.3, 117.0' - Bedding plane or	$\perp$	<ul> <li>gray/black staining from 117.5-117.9'</li> </ul>	-
_				mechanical break (3), <10 deg, rough,	┢╾	=	_
	R10-NQ	13	>10	undulating to stepped, tight to open <1/2"			
	5 ft 56%	13		116.0-116.1, 117.2-117.8' - Fracture zone	Ш	「 <u> </u>	
_				(2), fine to coarse gravel-sized fragments	${f  o}$	- No Recovery 117.8-120.0'	-
_				-		-	-
_			NR		₽	<del>-</del>	
							R10: 3 minutes
120	120.0				$\vdash$		
-79.2	120.0			120 151 Frontiss 20 50 dos rough	╁	Limestone	_
-			3	120.15' - Fracture, 30- 50 deg, rough, undulating, open <1/4"		<ul> <li>120.0-124.85' - yellowish gray, (5Y</li> </ul>	-
_				120.55' - Fractures, 10 - 50 deg, undulating,	┢	8/1), fine to medium grained, strong	_
			>10	smooth to rough, open <1/2"		HCl reaction, extremely weak (R0),	
			/10	121.0, 121.1, 121.25, 121.4, 121.6, 121.65,		<ul> <li>trace secondary recrystallization voids</li> </ul>	_
_	R11-NQ			121.8, 122.05, 122.1, 122.2, 122.75, 122.8,	╁	_ *************************************	_
_	5 ft	16	>10	122.95' - Bedding plane (13), <10 deg, smooth, undulating, open <1/4"		-	_
	97%			omoon, andalang, open >1/+	oxdot	<u>-</u>	_
				123.2, 123.4, 123.45, 123.75, 124.2, 124.35' -	$\vdash$		
1 7			6	Fractures (6), 10 - 50 deg, undulating,			1
-				smooth to rough, <1/2" open	$\vdash$	-	R11: 3 minutes
-			3	-	仜	-	-
	125.0		NR	124.7' - Bedding plane, <10 deg, smooth,	厂	— No Recovery 124.85-125.0'	
-84.2			-	undulating, open <1/4"	$\vdash$	Limestone	
1 7			3	125.2, 125.4, 125.9' - Bedding plane (3), <10 deg, smooth, undulating, open <1/2"		125.0-129.45' - yellowish gray, (5Y	1
-				125.9' - Fractures, 30 deg, smooth,	╀	- 8/1), fine to medium grained, strong	16:00 Stopped drilling and
-			3	undulating, tight to open <1/4"		HCl reaction, extremely weak (R0)	left core barrel in overnight -
				126.1, 126.2, 126.3, - Bedding plane (3), <10		_	due to possibility of hole
	R12-NQ		_	deg, smooth, undulating, open <1/2"	$\vdash$		caving
	5 ft 89%	38	5	127.1' - Fractures, 30 deg, smooth, undulating, tight to open <1/4"		=	1
-	0070			127.8, 127.9, 128.2, 128.5, 128.7, 128.85' -	╙	-	-
-			3	Bedding plane (6), <10 deg, smooth,	$\vdash$	-	-
				undulating, open <1/2"	广	<u>-</u>	<b> </b>
			2	129.25' - Fractures, 30 deg, smooth,	$\vdash$		R12: 5 minutes
130	130.0		NR	undulating, tight to open <1/4"		No Recovery 129.45-130.0'	1
130	130.0				1	140 AGGOVERY 120.40-100.0	_
					1		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-01	SHEET	8	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723999.6 N, 457491.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

MONTER LIVELS 1.0 Ribbon on \$2007   START \$5020007   END \$500007   LOCKERS R. Basky   Communication of the property of the p					IENT . CIVIE 33 3/IN 299203, ITIUU TOLATY, INQ LOOIS, HVV C			ORIENTATION: Vertical
Section   Communication   Co	WATER	LEVELS : 1.0	ft bg	s on 5		<u>30/200</u>		<del> </del>
139	>00	(6			DISCONTINUITIES	υ	LITHOLOGY	COMMENTS
139	ON E	, ND / (%) /		S	DESCRIPTION	] 2 [	ROCK TYPE COLOR	
139	표원인	E, A	(%	품		- 2	MINERALOGY, TEXTURE,	
139	H Ä K	GTF OV	۵)	PS		<u>B</u>		SMOOTHNESS, CAVING RATE AND
139	P.S.E.	E E S	Ø	RA		≥		
140   140.0   140.2   150.4   130.7   131.0   131.1   131.2   131.5		0715	IĽ.	ша		o		
131 25 - Bedding plane or mechanical break (7) - 10 deg, undulating, smooth to rough, open <1/2"   132.0   132.5   132.6   132.75   132.95   132.5   132.6   132.5	-89.2			<b>-10</b>	130.2. 130.4. 130.7. 131.0. 131.1. 131.2.	Н	Limestone	
No.   No.				/10	131.25' - Bedding plane or mechanical break	Ш		1
No.   No.	-					╁┼	HCl reaction, extremely weak (R0).	1
R13-NO   5	-			5		╀┼	very fine grained from 130.7-131.3'	1 4
130					131.3 - Fractures, 15 -20 deg, smooth,	Ш		
13.9   13.9								
133   136   137   138			73	7	133.9' - Bedding plane or mechanical break	₩	-	1 7
133.95	-	96%			(7), <10 deg, undulating, smooth to rough,	╆	-	1
135   135	_			0	open <1/2"	$\Box$	-	
3						Н		134.1
135.0						Ш	-	R13: 5 minutes
MR	1			3	S .	╁┼┼	-	1 +
Semonth to rough   Semonth to   Semonth   Semon		135.0		NR		╂╫	─ No Recovery 134.9-135 0'	1
135.1 135.25, 135.3, 135.4, 135.6, 135.75, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.2, 136.1 136.1 136.2, 136.1 136.1 136.2, 136.1 13	-94.2			-		Д		]
136.1, 136.2, 136.3° - Bedding plane or mechanical break (9), <10 deg, smooth, planar to undulating, open <1/4"   136.4° - Fracture or mechanical break (13, <10 deg, smooth, planar to undulating, light to gent <1/4"   140				J		Н		
R14-NO   Sit   7	1 7				136.1, 136.2, 136.3' - Bedding plane or	ᡛ᠊ᡰ		1
R14.NO	-			9		ш		1 -
140					planar to undulating, open <1/4"	╆┼┼		_
140				6			material with lineations (1/8" thick) of	
140			′	0		Ш	yellowish gray (5Y 8/1) and light olive	1
140	-	. 0,0				+	0 1 7 0 1	1
140   140.0   NR	-			3			voids	-
140   140.0   NR						щ	No Decement 420 0 440 01	
140   140				ND	open <1/4"	Н	No Recovery 138.9-140.0	R14: 5 minutes
140.2, 140.3' - Bedding plane or mechanical break (2), <10 deg, smooth, undulating, tight to popen <1/2''   140.7' 140.9' - Fracture, vertical, rough, undulating, open <14''   140.7' 140.9' - Fracture zone   141.1, 141.7, 141.95, 142.2, 142.25, 142.35, 142.35, 142.36, 143.85   14	140	140.0		INIX		П	-	1
140.2, 140.3" - Bedding plane or mechanical break (2), <10 deg, smooth, undulating, tight to open <1/2"   140.5" - Fracture vertical, rough, undulating, open <1/4"   140.7-140.9" - Fracture zone		140.0			_	╂┼┼	Limestone	1 -
145	-			>10		柵		-
140.5' - Fracture, vertical, rough, undulating, open <1/4'						Щ		]
Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Open <1/a>   Ope						Н		
R15-NO   5 ft   80%				3		ш		1 1
141.1, 141.7, 141.95, 142.25	-	D15 NO				╁┼┼		Driller's Remark: 142-143'
142.88, 143.10, 143.50 - Bedding plane or mechanical break (10), '-10 deg, rough, undulating, tight to open <1/2"  145. 145.0  145. 145.0  -104.2  -104.3  -104.2  -104.2  -104.2  -104.2  -104.2  -104.2  -104.2  -104.2  -104.2  -104.2  -10	-			4		₽		
rough, undulating, tight to open <1/2"    143.65-143.85' - Fracture zone								1000
143.65-143.85' - Fracture zone  145. 145.0  -104.2  -104.3  -104.6.7' - yellowish gray, (5Y  -104.6.7' - yellowish gray, (5Y  -104.6.7' - yellowish gray, (5Y  -104.6.7' - yellowish gray, (5Y  -104.6.7' - yellowish gray, (5Y  -104.5  -104.6.7' - yellowish gray, (5Y  -104.6.7' - yellowish gra						Н		1
145.05-143.85 - Fracture zone  145.05' - Bedding plane or mechanical break, 10 deg, smooth to rough, planar to undulating 145.7, 145.75, 146.0' - Bedding plane or mechanical break (3), <10 deg, smooth to rough, planar to undulating 146.0-146.35' - Fracture zone  R16-NQ 5 ft 90%  R16-NQ 5 ft 190%  R16-NQ 190%  R16-NQ 146.85' - Fracture zone 146.85' - Fracture zone 146.85' - Fracture zone 146.85' - Fracture zone 146.85' - Fracture zone 146.86' - Bedding plane or mechanical break (2), <10 deg, smooth to rough, planar to undulating 147.3' - Bedding plane 147.47' - Bedding plane  R16-NQ 5 ft 190%  R16-NQ 1	-			>10	J. J. J. J. J. J. J. J. J. J. J. J. J. J			Driller's Remark: 143.5-
A casts No Recovery 144.0-145.0'  Limestone  145.0 145.0 145.0 145.0' 145.5-145.6' - Fracture zone 145.7, 145.75, 146.0' - Bedding plane or mechanical break, 145.7, 145.75, 146.0' - Bedding plane or mechanical break (3), <10 deg, smooth to rough, planar to undulating 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.83, 146.86' - Bedding plane or mechanical break (2), <10 deg, smooth to rough, planar to undulating 147.3' - Bedding plane 150 150.0 NR  R15: 5 minutes  No Recovery 144.0-145.0'  Limestone 145.0-146.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, strong (R4), voids (1/16") over 15% of surface, abundant grained, strong HCl reaction, very weak (R1), trace coarse grained material, voids (<1/16") over 40-50% of surface, abundant fossil casts and molds  R16: 6 minutes  No Recovery 149.5-150.0'  Bottom of Boring at 150.0 ft bgs on	-				143.00-143.80 - Fracture zone	口		144' soft -
145_04.2 -104.2 -104.2 -104.2 -104.2 -104.2 -104.2 -104.2 -104.2 -105.0 -104.2 -105.0 -104.2 -105.0 -104.2 -105.0 -106.5				NR		╁┼┼		R15: 5 minutes
-104.2 - 10	145	145.0				Ш		
Signature   Sign					145.05' - Bedding plane or mechanical break.	Ш	Limestone	
145.5-145.6' - Fracture zone 145.7, 146.0' - Bedding plane or mechanical break (3), <10 deg, smooth to rough, planar to undulating 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Fracture zone 146.0-146.35' - Yellowish gray, (5Y 7/2), fine to medium grained, strong HCI reaction, very weak (R1), trace coarse grained material, voids (<1/16") over 40-50% of surface, abundant fossil casts and molds  R16: 6 minutes  No Recovery 149.5-150.0'  Bottom of Boring at 150.0 ft bgs on	-			>10	10 deg, smooth to rough, planar to undulating	╂┼┼	- 145.0-146.7' - yellowish gray, (5Y	1 +
R16-NQ 5 ft 90% 3 146.0-146.35' - Fracture zone 146.83, 146.86' - Bedding plane or mechanical break (2), <10 deg, smooth to rough, planar to undulating 146.0-146.35' - Fracture zone 146.83, 146.86' - Bedding plane or mechanical break (2), <10 deg, smooth to rough, planar to undulating 147.3' - Bedding plane 147.3' - Bedding plane 147.47' - Bedding plane 150.0 NR	-				145.5-145.6' - Fracture zone	口		1 4
rough, planar to undulating  R16-NQ 5 ft 90%  R16.83, 146.85' - Fracture zone 146.83, 146.86' - Bedding plane or mechanical break (2), <10 deg, smooth to rough, planar to undulating 147.47' - Bedding plane  R16-NQ 5 ft 90%  R16.65' - Mechanical break - 146.83, 146.86' - Bedding plane or mechanical break (2), <10 deg, smooth to rough, planar to undulating 147.47' - Bedding plane  R16: 6 minutes  R16: 6 minutes  R16: 6 minutes				>10		Ш		]
R16-NQ 5 ft 90%				10		Ш		1
5 ft 90%	1 7	R16-NO				口	146.7-149.5' - yellowish gray, (5Y	1 1
mechanical break (2), <10 deg, smooth to rough, planar to undulating 147.3' - Bedding plane 2 150.0 NR Coarse grained material, voids (<1/16") over 40-50% of surface, abundant fossil casts and molds R16: 6 minutes R16: 6 minutes Bottom of Boring at 150.0 ft bgs on	-	5 ft		3	146.65' - Mechanical break	╂┴╂	7/2), fine to medium grained, strong	1 -
3 rough, planar to undulating 147.3' - Bedding plane 2 147.47' - Bedding plane 3 150.0 NR Secovery 149.5-150.0'  Bottom of Boring at 150.0 ft bgs on		90%				H		1
147.3' - Bedding plane 2 147.47' - Bedding plane No Recovery 149.5-150.0'  Bottom of Boring at 150.0 ft bgs on				2		口		
2 147.47' - Bedding plane	1 1			ა		ш		1
150 150.0 NR NR No Recovery 149.5-150.0'  Bottom of Boring at 150.0 ft bgs on	-			2		丗		R16: 6 minutes
Bottom of Boring at 150.0 ft bgs on	-					$\Box$	No Pocovory 149 F 450 0'	
	150	150.0		NR		Ш		
5/30/2007								
							5/30/2007	



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	B-01	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723999.6 N, 457491.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER LEVELS: 1.0 ft bgs on 5/23/07		s on 5/	23/07 START : 5/23/2007			COT LOGGER : R. Bitely			
	_			DISCONTINUITIES		(D	LITHOLOGY	COMMENTS	
NO (#)	-28°		Ś	DESCRIPTION		ΓO	ROCK TYPE, COLOR,		
BH	ER'A	<u>@</u>	불			CIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND	
TH X	150 100 100 100 100 100 100 100 100 100	5)	F	DEPTH, TYPE, ORIENTATION, ROUGHN PLANARITY, INFILLING MATERIAL AN	IESS,	lB0	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIG	HTNESS	SYMBOLIC LOG	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.	
	014	_		147.65' - Bedding plane or mechanical		-		Total depth = 150.0'	
_				<10 deg, smooth to rough, planar to	bicak,		_	10tal deptil = 130.0	
I _				undulating				<b>l</b> _	
				148.35' - Mechanical break, smooth, undulating, open <1/8"					
				148.55, 148.75, 148.9, 149.0, 149.15' -			_	1	
-				Bedding plane (5), <10 deg, undulating	,   -		_	-	
_				smooth to rough, tight			-	-	
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-02	SHEET	1	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724128.3 N, 457619.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION: Vertical										
WATER	LEVELS	: 4.0 ft b	gs on 4/1	8/07	START : 4/18/2007 END : 4/19/2007 LOGGER : T. Stewart					
				STANDARD	SOIL DESCRIPTION COMMENTS					
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPI F	INTERVA	J (ft)	PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY					
ELC ON	O/ WIII EE			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, $\frac{\Box}{\Box}$ DEPTH OF CASING, DRILLING RATE,					
ATI ATI		RECOVE	ERY (π)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND					
E S S			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY					
<u>оош</u> 41.8	0.0			(N)	Poorly Graded Sand With Silt (SP-SM)					
	0.0			2-2-2	0.0-1.0' - mottled dark gray, yellowish gray and pale - 11					
I ₋		1.0	SS-1	(4)	yellowish brown, (N3, 5Y 8/1 and 10YR 6/2), moist,					
	1.5				very loose, very fine to fine grained silica sand, 5-10%  NW-Rod (5.0' sections)  NW-Rod (5.0' sections)					
					\  \  \  \  \  \  \  \  \  \  \  \  \					
-					near top 24" split spoon (SS)					
-					8:56 Driller's Remark: 3-7/8" tricone roller					
-					- drill bit in use, 2.0' adaptor length (to help set					
_					5.0' stroke) when drilling					
_					Add 1/2 bag bentonite to mud vat					
					Water level assumed at 4.0' below ground - surface due to moisture content of SS-1 and					
5	5.0				SS-2					
36.8	0.0				Clayey Sand (SC)					
-		0.5	SS-2	2-3-2	5.0-5.5' - moderate yellowish brown and pale green,					
-		0.5	33-2	(5)	\ (10Y 5/4 and 10G 6/2), mottled, moist to wet, loose, 30-35% medium plastic, fine grained silica sand,					
_	6.5				\cohesive_trace_rounded_concretions_un_to_1/4" dusky \ -					
_					brown (5YR 2/2), trace roots up to 1/16" and 2"  9:32 Driller's Remark: a rock ledge at 6.5'					
					11					
_										
_										
-										
_					<b>.</b>					
10	10.0									
31.8					Silt With Sand (ML)					
		1.2	SS-3	1-5-42	10.0-11.2' - grayish yellow to moderate yellow, (5Y 8/4 - to 5Y 7/6), wet, hard, nonplastic, very rapid dilatancy,					
_	11.5			(47)	mild to moderate HCl reaction, 5-10% fine to medium 📑 📖 10:17 Driller's Remark: switched to 4-3/4"					
-	11.5				grained silica sand, 20% medium to coarse grained in /- tricone roller bit to straighten out the hole,					
-					\( \sum \) \( \price \) \( \pri					
_					Original B-2 hole has been offset 1.5' NW					
_					and re-drilled. This redrilled hole will be					
					called B-2R ("R" for redrill). Original B-2					
					- borehole could not be straightened to 90° Add 1/4 bag bentonite					
-					11:26 Driller's Remark: 12.5-14.5' soft					
	4==				drilling, hard slow drilling at 14.5', 2' adaptor					
15 <u> </u>	1 <u>5</u> .0 15.2	0.1	SS-4	50/2	and 1-3/8" tricone roller drill  Limestone Fragments					
		\_ <del>\</del>	\ <u>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </u>	(50/2")	│ \ 15.0-15.1' - grayish yellow to moderate yellow, (5Y 8/4 │					
_					\to 5Y 7/6), moderate to strong HCl reaction, poorly / _					
					fossiliferous					
					1					
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PROJECT NUMBER:

33884.FL

BORING NUMBER:

B-02

SHEET 2 OF 8

### **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724128.3 N, 457619.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

					,	END: 4/10/2007		р٠т	ORIENTATION : Vertical
WATER	LEVELS	: 4.0 ft bo	S UH 4/18		START : 4/18/2007	END : 4/19/2007 SOIL DESCRIPTION	LUGGE		. Stewart COMMENTS
돌무를	SAMPLE	INTERVA	l (ft)	STANDARD PENETRATION		JOIL DECORM HOR		8	COMMENTO
SELC SE Al	SAMPLL	SOIL NAME, USCS GROUP SYMBOL, COLOR,							DEPTH OF CASING, DRILLING RATE,
DEPTH BELOW SURFACE AND ELEVATION (ft)		RECOVE		6"-6"-6"		E CONTENT, RELATIVE DENS CY, SOIL STRUCTURE, MINE		SYMBOLIC LOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEP SUR ELE			#TYPE	6"-6"-6" (N)	CONSISTEN	OT, SOIL STRUCTURE, WINE	INLOUT	SYN	INSTRUMENTATION
21.8	20.0				Silty Sand (SM	<b>(5)</b>	£		Driller's Remark: softened drilling at 16.5-
-		1.1	SS-5	10-10-24 (34)	20.0-21.1' - gra	ayish yellow, (5Y 8/4), wet, c ined, moderate to strong H0	lense, fine Il reaction	111	20.0'
-	21.5			(34)	→ 30-40% nonpla	astic fines, 5-10% fine grave	I, trace fine /	711	1
_	21.0				grained silica s	sand moderate gray (5G 5/6 ned silica sand white particle	) particles, es all	1	1
-					carbonate		J	1	13:27 Driller's Remark: 21.5' hard drilling,
_								1	soft again at 23.0'
-								1	1
-								1	1
-								1	1
25	25.0							1	1
16.8	20.0	0.8	SS-6	47-50/4	Silt (ML)			111	<b>∏</b>
_	25.8	0.0	33-0	(100")	25.0-25.8' - gra	ayish yellow, (5Y 8/4), wet, r ancy, moderate to strong H	ionplastic, Cl reaction = r	Ш	4
_					\ 10-15% very fir	ne to fine grained, 5-10% fir	ne grained /	1	1
_					silica sand whit	te particles, homogeneous,	all /	1	13:50 Driller's Remark: 26.5' hard drilling
_					(oa. portato			1	1
								1	1
								1	1
-								1	13:55 Driller's Remark: 28.5-29.5' soft drilling
-								1	1
30	30.0							1	1
11.8					Silt With Sand			TII	1
-		1.3	SS-7	48-39-37 (76)	to moderate ve	me as 25.0-25.8' except yel ellow, (5Y 8/4 to 5Y 7/6), well	lowish gray	111	1
	31.5			(10)		y rapid dilatancy, 20-25% ve	ery fine to	Ш	1
					\medium graine	ed Silica Sand		1	1
								1	1
								]	1
								]	1
1 7								1	1
								1	14:08 Driller's Remark: hardened drilling at
35	35.0							]	34.0'
6.8	35.3	0.3	SS-8	50/3	Silty Gravel Wi	ith Sands (GM)	VD 5/4\	<u> </u>	4
				(50/3")	wet, dense, mil	oderate yellowish brown, (10 ld to moderate HCl reaction	, fine	]	1
					gravel-sized an	ngular to subangular limesto % fine to coarse grained silio	ne	]	14:23 Remove silt/sand cuttings from mud vat, add 1/4 bag bentonite before continuing
						% low plastic fines	,a	]	down hole to 40'
								]	1
								]	1
								]	14:34 Driller's Remark: Observe light to moderate drill chatter and bouncing
								]	moderate unii oriattei and bouncing
									]
40								L	
							<u> </u>		



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	B-02	CHEET	3 OE 8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724128.3 N, 457619.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

						tary, catheau, NVV 100S, 5-7/6			ORIENTATION : Vertical
WATER	LEVELS	: 4.0 ft b	us on 4/18		START : 4/18/2007	END: 4/19/2007 SOIL DESCRIPTION	LOGGER	. 1.	Stewart COMMENTS
≥□⊋				STANDARD PENETRATION		OUIL DEOURIPTION		၅၉	COIVIIVIEN 15
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBOL	COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BI ATIC		RECOVE	ERY (ft)		MOISTURE	E CONTENT, RELATIVE DE	NSITY OR	30L	DRILLING FLUID LOSS, TESTS, AND
FR 문			#TYPE	6"-6"-6"	CONSISTEN	NCY, SOIL STRUCTURE, MI	NERALOGY	YME	INSTRUMENTATION
1.8	40.0			(N)	Silt With Limo	estone Fragments (ML)		S	
1.0	40.0			50-46-37	40.0-41.5' - mo	oderate olive brown, (5Y 4/	(4), wet, hard, -		-
_		1.5	SS-9	(83)	nonplastic to lo	ow plasticity, rapid dilatanc	y, mild to _		_
l _	41.5				moderate HCI	reaction, 5-10% very fine very fine to fine grained sil	grained silica lica sand —	Ш	_
					\ medium dark c	gray (N4) fragments, 40.0-	40.4' lens of		
					\1/8"-1/4" thick	limestone disks, all carbor	nate /		
							_	1	1
-							_	1	1
-							_		1
-							-	1	-
,	45.0						_		
45 -3.2	45.0				Silty Sand (SN	M)		1111	15:24 45-50' with very light chatter
-		1.1	SS-10	16-34-50/3	45.0-46.1' - mo	oderate olive brown to light			intermittently –
-	46.3			(84/9")		5/2), wet, very dense, fine to moderate HCl reaction,		Ш	-
_					gravel-sized, 3	36% nonplastic fines, trace	very fine /-		-
-					black fragment	its, one 1/2"x1/4" brittle bla	ck fragment, / _		_
_					gray staining n	near black fragment, all car	bonate		_
							_		_
							_		
							_		Driller's Remark: 48.5' to bottom was soft
-							-		drilling (very soft)
50	50.0						-		1
-8.2	50.5	0.5	SS-11	40-50/0.5		d Limestone Fragments (		Ш	15:45 Driller's Remark: 50% circulation loss
-	50.5			(90/6.5")		usky yellow to moderate oli wet, very dense, fine to co		1113	-
-						ate HCl reaction, 25% non			-
-					60% of sample	e is limestone fragments 1	4"-3/8" thick   -		-
-						1" fragments, trace brownistaining on limestone, all ca			15:54 Driller's Remark: 52.0-53.0' soft drilling
-					E/ 1) organio da	diring off inflootofie, an ear	-		- Total Briller & Nerhank. 52.5-55.0 Soft drilling
-							-		
-							-		_
							_		<u> </u>
_							_		16:22 Driller's Remark: last SS/SPT for B- 2R, will switch to NQ coring assembly, will
55	55.0								install 55' of 3" NW
-13.2	55.3	0.3	SS-12	50/4	Limestone Fra		70.1 (EV 7/0		8:07 Water level on 4/19/07 is 1.2'
1 7				(50/4")	to 5Y 5/2), wet	ellowish gray to light olive g t, mild to moderate HCl rea	ray, (or 7/2		
					Begin Rock Co	oring at 55.5 ft bgs			1
-					See the next s	sheet for the rock core log	_		1
-							-		
-							_		
-							-		-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-02	SHEET	4	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724128.3 N, 457619.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS : 4.0	) ft bgs	s on 4/	118/07 START : 4/18/2007 END : 4/	19/20	07 LOGGER : T. Stewart	
300	()			DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_	55.5		NR	-		No Recovery 55.5-56.7'	3" NW casing is set to 55.5', 50 lb bags of – QuikGel brand bentonite
-			3	56.75, 56.85' - Fractures (2), rough,		Limestone 56.7-57.0' - dusky yellow, (5Y 6/4),	- 8:57 Total depth tape measured at 55.5' below - ground surface
_	R1-NQ 5 ft 76%	62	1	57.0' - Fracture, horizontal, rough, undulating, open <1/2"-1/16" 58.1' - Fracture, 60 deg, rough, undulating,		<ul> <li>mild to moderate HCl reaction,</li> <li>extremely weak to very weak (R0 to R1), friable, 30-35% spheroidal voids</li> </ul>	9:12 Added 1/8 bag to mud vat – SC-1 collected at 57.0-
-	10,0		0	tight -		<ul> <li>&lt;1/16"</li> <li>57.0-60.5' - olive gray with yellow gray mottling, (5Y 3/2 with 5Y 7/2),</li> </ul>	58.15'
60_ -18.2			2			<ul> <li>moderate HCl reaction, highly</li> <li>laminated in black discontinuous</li> <li>ribbons (&lt;1/16" thick), voids &lt;1/16"</li> </ul>	R1: 13 minutes
-	60.5		0	60.55' - Mechanical break, rough, undulating, tight, fragments in rock matrix to 1/4"		<ul> <li>up to 20% of surface, 60.0-60.5' is yellowish gray (5Y 7/2) with 10-15% fine to medium grained organic black</li> </ul>	
-			0	61.5' - Mechanical break, horizontal  62.15' - Mechanical break, horizontal, rough,		<ul> <li>fragments horizontally aligned, laminations are horizontal then grade to wavy downward</li> </ul>	
-	R2-NQ 5 ft 90%	75	0	undulating, tight 62.4, 62.9' - Mechanical break (2), horizontal, rough, undulating, tight		<ul> <li>60.5-61.5' - light olive gray, (5Y 5/2), moderate HCl reaction, medium</li> <li>strong (R3), voids &lt;1/16" over</li> </ul>	-
-	90 %		1	63.0' - Mechanical break, 3-7 deg, rough, undulating, tight		<ul> <li>20-25% of surface, poorly fossiliferous (casts up to 3/8"), 10%</li> <li>short black discontinuous laminae</li> </ul>	-
65_ -23.2	05.5		1 NR	64.5' - Mechanical break or bedding plane, horizontal, rough, undulating, open 1/4"-1" —		<1/16" thick 61.5-65.0' - dusky yellow, (5Y 6/4), mild HCl reaction, very weak (R1),	R2: 3 minutes —
-	65.5		1	64.8' - Fracture or mechanical break, 75-85 deg, rough, undulating, tight 65.6' - Mechanical break or bedding plane,		_ 35-40% voids up to 1/16", trace 3/16" elongated cavities, poorly fossiliferous (casts 3/16"), trace	-
-			0	horizontal, rough, planar, open 1/4" 66.15' - Mechanical break, horizontal to 5 deg		voids infilled with medium gray mineralization, medium gray staining over interval	-
-	R3-NQ 5 ft	98	0	67.3, 67.5' - Mechanical break (2) -		<ul> <li>No Recovery 65.0-65.5'</li> <li>Limestone</li> <li>65.5-70.5' - dusky yellow, (5Y 6/4),</li> </ul>	-
-	100%		2	68.55' - Fracture or bedding plane, rough, undulating, tight	Ħ	very fine grained, mild to moderate HCl reaction, very weak to medium strong (R1 to R3), voids up to 1/16"	
70_ -28.2	70.5		1	69.4' - Fracture or mechanical break, horizontal, rough, undulating, open up to 5/8" 69.8' - Fracture or mechanical break,		over 25-35% of surface, medium gray staining over 20% of surface, — powdery feel in sections of core run	R3: 8 minutes
-	70.0		0	horizontal, rough, undulating, tight to open 1/4", vertical stress joints from 69.8-70.35'		70.5-73.55' - moderate brown to grayish brown, (5Y 4/4 to 5Y 3/2), moderate HCl reaction, medium	]
-			1	- - 72.1' - Bedding plane, horizontal, rough,		strong to strong (R3 to R4), voids up to 3/16" spheroidal over 30-40% of surface, trace 1/4"x3/16" elongated	- 11:10 Additional 0.35'
-	R4-NQ 5 ft 91%	77	0	undulating, carbonate fine infill up to 1/4" thick 72.8, 72.95, 73.1' - Mechanical break (3)		cavities, poorly fossiliferous (casts up to 1/4") 1" thick extremely weak (R0) rock layer at 72.1'	recovered during R5-NQ - core run which belongs in the R4-NQ data.
-			1	73.55' - Bedding plane, 20-30 deg, rough, undulating, contact with extremely weak rock (R0) below and medium strong to strong (R3		- ´	Driller's Remark: Able to identify redrill marks on core pieces
75_ -33.2	75.5		2 NR	to R4) rock above		- 	R4: 10 minutes —
							î .



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-02	SHEET	5	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724128.3 N, 457619.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS: 4.0	ft bgs	on 4/	18/07 START : 4/18/2007 END : 4	/19/20	07 LOGGER : T. Stewart	
≥□≎	( ( ·			DISCONTINUITIES	ő	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
AGE	J.H.	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ğ	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FEN	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND	ΥMB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
교외교	Z E C	ď	F F	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	,
_			3	74.65' - Bedding plane or mechanical break, horizontal, rough, undulating, tight to open	┵	Limestone 73.55-75.05' - pale greenish yellow to	
_				1/8"	$oldsymbol{\square}$	yellowish gray, (10Y 8/2 to 5Y 7/2),	
			3	74.75' - Bedding plane or mechanical break,		very fine grained, strong HCl	
			3	horizontal, smooth, planar, tight 75.6' - Fracture, 40 deg, smooth, planar,	$\mathbf{H}$	<ul> <li>reaction, very weak (R1), voids /16"</li> <li>over 10-15% of surface, poorly</li> </ul>	1
_	R5-NQ			tight, through very weak rock (R1)		fossiliferous (casts up to 3/8"x1/8",	1
_	5 ft 98%	80	0	75.75' - Fracture, 30 deg, smooth, planar, tight, through very weak rock (R1)	1	<ul> <li>powdery feel, trace black staining in casts)</li> </ul>	1
-	0070			75.8' - Fracture, 20 deg, smooth, planar,	┰	No Recovery 75.05-75.5'	1
-			0	tight, through very weak rock (R1) 76.5' - Fracture or bedding plane, horizontal,	士	<ul> <li>Limestone</li> <li>75.5-76.5' - yellowish gray, (5Y 7/2),</li> </ul>	1
-				rough, undulating, open 5/8"	+	very fine to medium grained, strong	R5: 11 minutes
80 <u> </u>			0	76.8' - Fracture, 20-30 deg, rough, planar,	+	— HCl reaction, extremely weak to very	-
-	80.5		NR,	open 1/8" 77.05' - Fracture or mechanical break,	世	weak (R0 to R1), 35-40% of this interval is medium gray (N5),	-
-			1	horizontal-5 deg, rough, undulating, tight	₩	_ medium grained, granular	-
_				77.95' - Mechanical break, horizontal, rough, undulating, tight	ፗ	appearance 76.5-78.75' - light olive gray to	1
_			1	80.9' - Bedding plane or mechanical break,	╁┰	_ moderate brown, (5Y 5/2 to 5Y 4/4),	_
_			·	horizontal, rough, undulating, tight	厈	medium strong (R3), voids to 1/16"	_
_	R6-NQ 5 ft	82	0	81.95' - Fracture, 30 deg, rough, undulating, open 1/8"-5/8"	上	over 40% of surface, dark gray (N3) infill, trace casts up to 3/8", trace of	
	88%	02	U			1/2" organic fragments	Driller's Remark: 5-10%
_					工	78.75-80.4' - yellowish gray, (5Y 7/2), very fine grained, strong HCl	circulation loss during run -
_			0		╁	reaction, medium strong to strong	1
85 -			1	84.61' - Fracture or mechanical break,	1	R3 to R4), trace 1"-1-1/2" cavities infilled with secondary mineralization	R6: 3 minutes
-43.2	85.5		NR	horizontal, rough, undulating, open 1/8"-1/2"	廿	No Recovery 80.4-80.5'	
-	00.0				╁┴	Limestone	1
-			0		$\blacksquare$	80.5-84.9' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4),	1
-					士	<ul> <li>moderate to strong HCl reaction.</li> </ul>	-
-			0		+	medium strong (R3), voids up to 1/16" over 20-25% of surface,	1
-	R7-NQ				+=	<ul> <li>moderately fossiliferous (casts up to</li> </ul>	-
_	5 ft	100	0	87.6, 88.0, 89.7' - Mechanical break (3), horizontal, rough, undulating, tight	世	5/8"), trace medium grain black organic fragments throughout,	-
_	100%			nonzoniai, rough, unduluting, ught	╨	- laminations of 3/16" thick over upper	1
-			0		ፗ	most 0.2'	_
-					$\perp$	No Recovery 84.9-85.5' Limestone	]
90			0	<u> </u>	F	85.5-90.5' - light olive brown mottled	R7: 7 minutes
-48.2	90.5				片	olive gray, (5Y 5/6 mottled 5Y 3/2), fine to medium grained, strong HCl	
			0		ᅪ	reaction, very weak to weak (R1 to	]
			0		H	R2), highly fossiliferous (casts, molds, microforams), yellowish gray	1
_					Т	(5Y 8/1) material as replacement infill	1
_			2	91.9-92.0' - Fracture, horizontal,	1	of echinoderms, 5-10% olive gray	1
-	R8-NQ			slickensided, undulating, clay infill, dry, soft clay 0.1' thick	广	<ul> <li>(5Y 4/1) wavy laminations throughout interval, up to 20% bioturbated zones</li> </ul>	1
-	5 ft	98	0	92.4, 93.0' - Mechanical break (2), horizontal,	╁	filled with both yellowish gray (5Y	SC-2 collected at 93.0-
-	100%			rough, undulating, tight	+	<ul> <li>8/1) infill around edges and medium dark gray (N4) infill inside/center.</li> </ul>	94.1'
-			1	94.0' - Fracture, 40-50 deg, rough,	士	very light gray (N7) carbonate silt	-
-				undulating, tight to open 1/8" (fossil mold	╁┯	mottling (hard) over the last 1.0' of run, 5-10% organics (black medium	R8: 10 minutes
95 <u> </u>			0	1-1/4" x 1/2" on fracture surface), fossils are whole spiral shaped casts	#	grain sized fragments) as short	
-55.2	95.5			whole spiral shaped casts	₽	laminations	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-02	SHEET	6	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724128.3 N, 457619.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS : 4.0	ft bg	s on 4	/18/07 START : 4/18/2007 END : 4/	19/20	D7 LOGGER : T. Stewart	
<b>₹</b> □₽	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R9-NQ 5 ft 96% 100.5	93	0 0 1 0 NR 1 0 0 0	96.2' - Mechanical break, horizontal-5 deg, rough, undulating, tight  97.7' - Fracture, horizontal, rough, undulating, tight to open 1/4", breakage in area with 3/4" size fossil casts and 3/8" spiral shaped casts 98.0, 99.0, 99.2' - Mechanical break (3)  100.7' - Fracture or mechanical break, horizontal, rough, undulating, open 1/16"		Limestone  90.5-95.5' - white to yellowish gray, (N9 to 57 8/1), very fine grained, strong HCl reaction, weak (R2), voids up to 15% increasing percentage with depth, moderate to highly fossiliferous (microforams, casts up to 3/16", mostly a few larger fossil casts), organic soil bed 1" thick at 91.95', trace cavities up to 3/8" rimmed with white, hard mineral (maybe replacement of echinoderms) 95.5-100.3' - Same as 95.5-100.3' except yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), strong HCl reaction, very weak (R1), very fossiliferous (microforams, casts and molds), voids or spaces between microforam casts and molds, trace cavities up to 5/8"x1/8" (possible echinoderms with white secondary mineralization as replacement), trace voids 1/8"x1/8", trace medium dark gray (N4), fine grained fragments in matrix, trace black short 3/8" discontiuous organic laminations,	R9: 4 minutes
105_ -63.2	105.5		0			"powdery" chalk-like feel over entire run No Recovery 100.3-100.5' Limestone	R10: 5 minutes
-110 -68.2	R11-NQ 5 ft 100%	83	0 2 1 2 0	106.3-109.0' - Fracture, vertical, large >2" sized fossil molds and casts along surface 106.65' - Fracture or mechanical break, horizontal, rough, undulating, tight 106.95' - Fracture or mechanical break, horizontal, rough, undulating, tight 107.65' - Fracture, vertical, rough, undulating, >2" size fossil casts or molds along surface 108.5' - Fracture or mechanical break, horizontal, rough, undulating, tight 108.7' - Fracture or mechanical break, horizontal, rough, undulating, tight		<ul> <li>100.5-105.5' - Same as 105.5-110.5' except 10% echinoderm molds up to 5/8"x1/8" with white calcite replacement, olive gray mottling (5Y 3/2) as wavy horizontal beds, from 103.0-104.0' trace organic black fragments as medium grained fragments throughout run, spheroidal to subrounded voids &lt;1/16" over 20-25% of surface, 130.5-131.2 is without olive mottling 105.5-110.5' - yellowish gray, (5Y 7/2), strong HCI reaction, very weak (R1), voids up to 1/16" over 35-40% of surface, from 105.5-107.5' grading to 15%, from 107.5-110.5' chalk-like</li> </ul>	R11: 7 minutes
- - - - - 115 -73.2	R12-NQ 5 ft 99%	99	1 0 0	111.45' - Fracture or mechanical break, horizontal, rough, undulating, tight  113.0' - Mechanical break  114.3' - Fracture, 20 deg, rough, undulating, open 1/8"-1/4"		feel, very fossiliferous (casts from 1/8" to greater than 2"), spiral shaped casts and shell patterns 110.5-115.45' - no visible coral shaped casts, casts of echinoderms/ ostracods 1/4"x1/16" with white calcite mineral replacement	R12: 5 minutes
	110.0						



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-02	SHEET	7	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724128.3 N, 457619.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS: 4.0	ft bgs	on 4/	18/07 START : 4/18/2007 END : 4	1/19/20	07 LOGGER : T. Stewart	
≥O.⊋	(%			DISCONTINUITIES	۱	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B	E RL 3TH, OVEF	(%) Q	TUF FOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPT SURF ELEV	SOR! ENG	ROD	FRAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	% 3∀ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	014	-				No Recovery 115.45-115.5'	SC-3 collected at 114.5-
-			1	115.7' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/8",	+	- Limestone	115.5'
_				surfaces of fracture have molds or voids filled	+	115.5-120.5' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak	-
_			0	with secondary mineralization 116.9' - Mechanical break, 50-60 deg, rough,	+	<ul> <li>(R1), very fossiliferous, microforams,</li> </ul>	-
-	R13-NQ			undulating, tight	$\Box$	casts of echinoderms/ ostracods with yellowish gray (5Y 7/2) replacement	-
_	5 ft	97	0		+	<ul> <li>mineralization, olive gray (5Y 3/2)</li> </ul>	-
-	100%				士	thin beds and laminations at 116.0', medium light gray staining from	
-			1		$\perp$	<ul> <li>118.0-119.0', rock sample contains</li> </ul>	-
					+	25-35% medium grain, medium dark gray (N4) fragments in rock matrix,	R13: 8 minutes
120 <u> </u>			0		+	— overall the sample has a "gritty" feel	_
-	120.5				+	120.5-125.4' - yellowish gray, (5Y	-
-			1		+	7/2), strong HCl reaction, weak (R2),	-
_				121.35, 121.5, 121.75, 122.05' - Fracture or	$\blacksquare$	voids <1/16" over 30-40% of surface, olive gray (5Y 3/2) staining over 20%	-
-			3	mechanical break (4), horizontal, rough, undulating, open 1/16"-1/8"	口	<ul> <li>of rock (122.0-122.7' and</li> </ul>	-
_	R14-NQ			undulating, open 1/10 - 1/0	$\pm$	124.0-124.45'), extremely weak (R0) rock at 124.35', very fine grained	-
_	5 ft	80	2	122.7' - Mechanical break, horizontal, rough,	+	<ul><li>limestone bed from 121.35-121.75',</li></ul>	-
-	98%			undulating, tight 123.0' - Mechanical break	#	medium strong, highly fossiliferous (microforams, casts), trace molds	_
_			2	123.35, 124.45' - Bedding plane (2), horizontal, rough, undulating, open 1/16"	片	- with white mineral replacement	-
_				123.5' - Bedding plane or mechanical break,	+	<del> </del>	R14: 7 minutes
125_ -83.2			0	rough, undulating, open up to 1/2" 123.75' - Mechanical break, horizontal,	$\perp$	<del> </del> -	K14. / IIIIIIutes
-00.2	125.5			rough, undulating, tight	<del> </del>	No Recovery 125.4-125.5'	-
_			0		$\perp$	_ Limestone	-
_					+	125.5-130.5' - yellowish gray and olive gray, (5Y 7/2 and 5Y 5/2), wavy	-
_			0		<b></b>	bedded, strong HCl reaction, very	-
-	D45 NO			107 E 107 CE 100 OL Machanical brack (0)	#	weak (R1), voids <1/16" over 5-10% of surface, trace molds with white	_
-	R15-NQ 5 ft	97	0	127.5, 127.65, 128.0' - Mechanical break (3), horizontal, rough, undulating	$\vdash$	_ calcite mineral replacement at sizes	_
-	100%				$\perp$	of 5/8"x1/8" and 3/16"x1/16", medium dark gray (N4), medium grain	-
_			1	100 0 100 El Daddin   100   100	$\perp$	particles over 30-40% of rock matrix	_
_				129.0, 129.5' - Bedding plane (2), horizontal, rough, planar, tight	$\perp$	1	D45: 0 minutes
130			2	129.75' - Fracture or mechanical break,	$\perp$	<u>L</u>	R15: 8 minutes
-88.2	130.5			horizontal, rough, undulating, open 1/4"	#	1	
_			0		$\perp$	130.5-135.3' - Same as 125.5-130.5' except no molds with replacement	
_					$\perp$	mineralization, casts up to 5/8"	
			1		$\Box$	(spiral shapes without infilling), more thinly bedded than 125.5-130.5'	
_				132.15' - Fracture, 20 deg, rough, planar,	口	2	
_	R16-NQ 5 ft	78	3	tight 132.75' - Bedding plane or mechanical break,	$\perp$	1	
_	96%	, 0		horizontal, rough, undulating, tight		Į.	
			4	132.95, 133.1' - Bedding plane or mechanical break (2), horizontal, smooth, planar, tight		1	
			-+	133.7' - Bedding plane or mechanical break,	片	1	SC 4 collected at 124.25
135			0	horizontal, rough, undulating, open 1/2" 133.95, 134.0' - Bedding plane or fracture,	┵	L	SC-4 collected at 134.35 135.3'
-93.2	135.5			horizontal, smooth, undulating, tight	$\perp$		R16: 10 minutes
1						i .	I



WATER LEVELS: 4.0 ft bgs on 4/18/07

PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-02	SHEET	8	OF	8

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724128.3 N, 457619.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

END: 4/19/2007

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing START: 4/18/2007

LOGGER : T. Stewart LITHOLOGY COMMENTS

300	·			DISCONTINUITIES	O	LITHOLOGY	COMMENTS
BELOW SE AND TON (ft)	tun, H, AND ERY (%	(%)	JRES	DESCRIPTION	NO LO	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(9	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_			(NR) 0	134.35' - Bedding plane, horizontal, smooth, planar, tight	H	No Recovery 135.3-135.5' - Limestone	-
-				- 136.65' - Bedding plane, horizontal, rough,	Ħ	135.5-136.8' - Same as 125.5-130.5' - 136.8' - intact discontinuity	1
_	R17-NQ		1	undulating, tight	H	136.8-138.6' - yellowish gray, (5Y 7/2), medium to coarse grained,	]
-	5 ft 100%	100	0	-		strong HCl reaction, very weak (R1),     chalk-like feel, medium dark gray	-
_			1	138.55' - Bedding plane or mechanical break, rough, undulating, open 5/8", exposed filled		(N4) particles over 25-30% of matrix, 5-7% medium dark gray (N4)	]
140_			0	cavities on surfaces		subrounded cavities up to 5/8" 138.6-142.8' - variegated yellowish gray to grayish yellow, (5Y 7/2 to 5Y	R17: 9 minutes
-98. <del>2</del>	140.5			140.35' - Mechanical break, horizontal,	H	8/4), very fine grained, strong HCl reaction, weak to medium strong (R2	-
-			2	rough, undulating, tight 140.85' - Bedding plane or mechanical break, horizontal, rough, undulating, tight	H	to R3), voids increasing with depth (1/16") ranging from 1-2% to 15-20%, fossil molds/casts common	_
-			2	141.55' - Fracture or mechanical break, horizontal, rough, undulating, open up to 3/4"	┢	with cavities 1-3/16"- 1-9/16" x 3/4"- 1-3/16" penetrating deep into core,	-
_	R18-NQ 5 ft	82	1	141.7' - Bedding plane, horizontal, rough, undulating, <1/32" brownish black organic material infill over 100% surface, tight	H	few cavities filled with very weak (R0) limestone with voids more than	]
-	98%			142.8' - Bedding plane, horizontal, rough, undulating, tight, horizontal mottling surface		40-50% decreasing with depth 142.8-145.4' - variegated yellowish gray to dusky yellow to light olive	-
			2	144.2' - Fracture, 30 deg, rough, undulating 144.4' - Fracture or mechanical break,	E	gray, (5Y 7/2 to 5Y 6/4 to 5Y 5/2), strong HCl reaction, medium strong	Driller's Remark: 144.0- 144.5' 50-75% loss of
14 <u>5</u> -103.2	145.5		0	horizontal, rough, undulating, open 1/2"	Ħ	(R3), voids over less than 1-2% of surface becoming more common with depth, thin black organic	circulation in a void (space approximately 80%) R18: 9 minutes
-			1	145.7' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/2"	H	laminae from subhorizontal to vertical throughout interval, thin	SC-5 collected at 144.4- 145.4'
_			0			subvertical to vertical fractures (tight), unbroken, permeate nearly full length of interval, trace fossil	]
-	R19-NQ		0	- 147.7, 147.9' - Mechanical break (2),	Ħ	<ul> <li>casts/molds predominantly in last 0.3'</li> <li>of interval</li> </ul>	-
_	5 ft 100%	92	0	horizontal, rough, undulating, tight  148.55, 148.6' - Bedding plane (2),	Ŀ	No Recovery 145.4-145.5' Limestone	]
-			2	horizontal, rough, undulating, crumbled rock fragment between surfaces	H	145.5-148.7' - yellowish gray mottled with light gray, (5Y 7/2 mottled with N7), fine to medium grained, strong	-
150 -108.2	150.5		0	_	┢	HCl reaction, very weak (R1), sharp contact at 146.4' with rocks above	R19: 5 minutes —
_	100.0			-		containing abundant lithoclasts up to 1/2" (well rounded to rounded nodules), possibly bioclastic,	Total depth is 150.5' on 4/19/07 -
-				-		<ul> <li>lithoclasts less apparent below contact, appears to be very thinly</li> </ul>	-
_						laminated, voids and trace cavities >3/8"x1/16" over 1-3% of surface 148.7-150.5' - yellowish gray, (5Y	
-						7/2), very fine grained, mild HCl reaction, medium strong to weak (R3	
-					-	to R2), very faintly mottled, voids up to 1/16" over 3-5% of surface, cavities rare (<1/16"x3/16")	-
-				_		Bottom of Boring at 150.5 ft bgs on 4/19/2007	-
					1	1	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-03	SHEET 1 OF 8				

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724210.1 N, 457702.3 E (NAD83)

ELEVATION: 43.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 4-3/4" tri-cone bit ORIENTATION : Vertical

					·	lary, carriedu, Avvo 1005, 4-3/			ONIENTATION: Vertical		
WATER	LEVELS	: 3.0 ft bo	gs on 3/2	6/07 S	START : 3/26/2007		LOGGE	R : T.	Stewart		
300				STANDARD		SOIL DESCRIPTION		Ä	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)				PENETRATION TEST RESULTS	0011 11115 11000 075177 5177751 557			SYMBOLIC LOG	DEDTH OF GAOING DOWN TO DATE		
표하는 기사		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR			OLK.	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND		
PT.			#TYPE	6"-6"-6"	CONSISTEN	NCY, SOIL STRUCTURE, MI	NERALOGY	₩B	INSTRUMENTATION		
100 E				(N)	Door O	101With 0 ' 'C'	5\	Ś	OAU audit and an El ANAL		
43.9	0.0			1-1-1		<b>d Sand With Organics (Si</b> ium gray to dusky brown, (		1	24" split spoon, 5' AWJ rod		
_		0.5	SS-1	(2)	\ 2/2), moist, ve	ery loose, very fine to fine s	ilica sand,	1			
	1.5			, ,	organics are fi	ines and roots		╛			
									Driller switch to N-rod, 4.75" tricone roller drill bit add 12.5lb quick gel bentonite		
								1	drill bit add 12.5ib quick gel bentonite		
-								1	<u> </u>		
_								1	Water level reached at ~3.0' below ground		
-								1	surface based upon SS-1 and SS-2 on - 3/26/07 at 12:00		
-								1	3/20/07 at 12:00		
	E 0							1	-		
5 38.9	5.0				Poorly Grade	d Sand With Silt (SP-SM)		177	-		
-		0.9	SS-2	6-7-9	5.0-5.9' - very	pale orange to grayish ora		拙	-		
-		0.9	33-2	(16)	8/2 to 10YR 7/	(4), wet, medium dense, ve sand, 5% nonplastic fines	ery fine to fine as black	+111	-		
_	6.5				particles and p	oale yellowish orange (10Y	R 8/6)	┨	-		
-					particles, trace	e fine gravel-sized concreti owish brown (10YR 5/4) ce	ons with	4	-		
_						(5YR 3/2) rims, trace roots		4	-		
_								1	_		
_								1	_		
_								1			
								⅃	_		
10	10.0										
33.9					Poorly Graded		NO to NZ	T			
		0.8	SS-3	5-6-7 (13)		ery light gray to light gray, ( dense, no HCl reaction, ve		1	_		
	11.5			(10)	rounded silica	sand, trace nonplastic fine	s that are	1	1		
-					predominantly	black particles		1	-		
-								1	-		
-								1	-		
-								1	Driller's Remark: Hitting hard rock at 13'		
-								1	drilling slow		
-								┨	-		
								┨	-		
15 <u> </u>	15.0				Fat Clay With	Sand (CH)		1	<u>-</u>		
			00.4	6-4-5	↑ 15.0-15.4' - me	edium light gray, (N6), wet	, stiff, /	1	-		
-		1.1	SS-4	(9)	\ medium to hig	th plasticity, no to low dilate gray (5G 6/1) and light oliv	ancy, mottled		4		
-	16.5					very fine to fine rounded si		4	-		
-					trace very fine	sand-sized black particles		1	-		
_					Fat Clay (CH)	uish white, (5B 9/1), moist,	stiff, medium	1	_		
_					to high plastici	ity, no to low dilatancy, no	HCI reaction,	1			
_					mottled with gr	rayish blue (5PB 5/2) strea nd-sized white particles	ks, 10% fine	1	_		
					to medium sar	iu-sizeu wiile parlicies					
]									]		
20								1	]		
							_	1			
		1	1	I	l			1			



1	PROJECT NUMBER:	BORING NUMBER:				
	338884.FL	B-03	SHEET	2	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724210.1 N, 457702.3 E (NAD83)

ELEVATION: 43.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 4-3/4" tri-cone bit ORIENTATION : Vertical

					VIN 1000/3, Hillu Totaly, Catheau, AWJ 1005, 4-3/4 III-colle bit Onicini ATION : Vertical	_
WATER	LEVELS	: 3.0 ft b	gs on 3/2	6/0 <i>/</i> S	START : 3/26/2007	$\neg$
30≘				STANDARD PENETRATION	SOIL DESCRIPTION COMMENTS	4
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE INTERVAL (ft)			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
H H H H H H H H H H H H H H H H H H H	RECOVERY (ft)				MOISTURE CONTENT, RELATIVE DENSITY OR DEFIN OF CASING, DRILLING RATE,  MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND	
F F F F			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	
				(N)		4
23.9	20.0			0.5.5	Lean Clay With Sand (CL) 20.0-21.2' - light gray, (N7), wet, stiff, 30% very fine to	
		1.2	SS-5	6-5-5 (10)	fine grained, low plasticity, slow to no dilatancy, no	
	21.5			()	HCI reaction, pale green (10GB 8/2) mottling, mottled	7
-					\at bottom (21.2'), trace of black particles, 50% very /- fine to fine silica sand, trace fine gravel-sized grains /-	1
-					- Into to this chica carta, trace time graves of care	-
-					-	+
-					-	-
-						4
_						4
_					<u> </u>	
25	25.0					
18.9					Silty Sand (SM) 25.0-26.25' - yellowish gray, (5Y 7/2), wet, very loose,	
		1.3	SS-6	2-1-2 (3)	medium grained, no HCl reaction, very fine to fine	1
-	26.5			(0)	L rounded silica sand, 20-30% nonplastic fines, trace of 二山山	1
-					\very fine sand-sized black particles	1
-					<u> </u>	1
-					-	+
-					-	+
-						4
-					] ]	4
_					<u> </u>	4
30	30.0					
13.9					Clayey Sand (SC) 30.0-31.2' - light olive gray mottled with greenish gray	
		1.2	SS-7	2-2-3 (5)	and purple streaks, (5Y 6/1 with 5GY 6/1), wet, loose,	
	31.5			(0)	no HCl reaction, very fine to fine rounded silica sand,	1
-					\20% medium plastic fines, trace very fine sand-sized /-	1
-					-	1
-					- 1	-
-					- 1	+
-						4
-						4
-						4
35	35.0					_
8.9				14.00.7	Silt (ML) 35.0-36.0' - light olive gray with olive black and dark	_[
		1.0	SS-8	14-28-7 (35)	yellowish brown, (5Y 5/2 with 5Y 2/1 and 10YR 4/2),	ا
	36.5			(30)	wet, hard, low plasticity, rapid dilatancy, 5-10% fine	1
-					\sand-sized black particles, mild HCl reaction from 35.5-40.0', carbonate material, organic seam at 35.0',	1
-					\0.35' thick black and brown mottling , strong organic / -	1
-					odor –	1
-						+
-					-	+
-				ĺ		-
-					-	4
40						4
				ĺ		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-03	SHEET	3 OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724210.1 N, 457702.3 E (NAD83)

ELEVATION: 43.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 4-3/4" tri-cone bit ORIENTATION : Vertical

					·	ary, carriedu, Avvo rous, 4-5/4			ONIENTATION : Vertical		
WATER	LEVELS	: 3.0 ft bo	gs on 3/26	6/07	START : 3/26/2007	END : 3/26/2007	LOGGEF	<u>₹ : T.</u>			
>				STANDARD		SOIL DESCRIPTION		ā	COMMENTS		
SAMPLE INTERVAL (ft) PENETRATION TEST RESULTS  RECOVERY (ft) #TYPE 6"-6"-6" (N)				PENETRATION TEST RESULTS				SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,		
				120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT. RELATIVE DENSITY OR			일			
H H H			<u> </u>	011 011 011		E CONTENT, RELATIVE DEN ICY, SOIL STRUCTURE, MIN		βBC	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION		
			#TYPE	6"-6"-6" (N)	CONSIGNEN	101, 0012 01110010112, Will t		S.⊀	ING THOME WITH THE		
3.9	40.0			(* -/	Silt (ML)			ш			
-				30-41-46	40.0-41.3' - ligh	ht olive gray, (5Y 5/2), wet,	very dense,	$\ \cdot\ $	-		
_		1.3	SS-9	(87)		grained, mild to moderate		4	_		
	41.5				reaction, 50% i	nonplastic fines, trace fine many sand-sized particles of	gravel-sized,	ш			
					broken into silt		Jan De				
-					(			1	1		
-							-	1	-		
-							-	1	-		
-							-		_		
							_				
									]		
45	45.0							1	1		
-1.1	10.0				Silty Sand (SM	Л)		111	-		
-		44	SS-10	29-40-46	45.0-46.4' - ligh	ht olive gray, (5Y 5/2), wet,	very dense,	1			
-		1.4	35-10	(86)		grained, mild to moderate, 10% coarse sand-sized, 3		1111	-		
I _	46.5					, 10% coarse sand-sized, 5 s, all carbonate	0-40% /-	111	_		
					(non-placed miles	o, a oa. oa.o		l			
							_	1	1		
_							-	1	1		
-							-	ł	-		
-							-	ł	-		
-							-	1	_		
							_				
50	50.0										
-6.1	50.5	0.5	SS-11	50/6		h Limestone Fragments (I		Ш	Start of sampling on 3/27/07		
-	30.3			(50/6")	─ 50.0-50.5' - yel	llowish gray, (5Y 7/2), wet,	hard,	ш	Driller's Remark: Soft drilling -		
-					reaction 40% f	id dilatancy, mild to modera fine to coarse sand-sized,	ate HCI 1/4"-1/2"	ł	-		
-						es at top and bottom of san		1	_		
					carbonate	'	· · .				
								l			
-							-	1	1		
-							-	1	1		
-							-	ł	-		
-					l		-	1	-		
							-	1	_		
55	55.0							L			
-11.1	55.4	0.3	SS-12	50/4.5	Silt With Sand	I (ML)		Ш	Light to moderate bit chatter over 1st foot		
-				(50/4.5")	55.0-55.3' - yel	llowish gray, (5Y 7/2), wet, lid dilatancy, mild to modera	hard, /-	1	(drilling from 51.5-55.0')		
-					reaction, 20% f	fine to medium sand-sized,	all /	1	-		
-					carbonate		-	ł	-		
_								1			
							_		Driller's Remark: Hard at 57', soft at 57.5', hard again at 58.3'		
]	60.0						-		Hard again at 50.5		
	60.2	0.2	SS-13	50/2.5			Г	H	1		
-	00.2			(50/2.5")	\ 60.0-60.2' - ligh	ht olive gray to olive gray, (	5Y 5/2 to 5Y  -	1			
-						to strong HCI reaction, fos medium grain sized black f		1			
-					very fine (1/32"	") spheroidal particles are t	he matrix	-	-		
60					, ,	, , , , , , , , , , , , , , , , , , , ,		L			
					Begin Rock Co	oring at 60.0 ft bgs		1			
					See the next sh	heet for the rock core log					



PROJECT NUMBER:

338884.FL

B-03

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724210.1 N, 457702.3 E (NAD83)

ELEVATION: 43.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS: 3.0	ft bgs	s on 3/	26/07 START : 3/26/2007 END : 3/	26/200	7 LOGGER : T. Stewart	
<b>₹</b> Ω₽	<u> </u>			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
ELO ON (f	ANG RY (9	_	ZES T	DESCRIPTION	O'C	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-16.1	60.0 R1-NQ 1 ft	85	0	CO CEL Manhagiral basels	Ħ	Limestone 60.16-61.0' - dusky yellow, (5Y 6/4),	R1: 1 minute
-	61.0 85%		2	60.65' - Mechanical break	崫	fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), voids up to 1/16" on 15-20% of	Start at drilling 3/28/07, water level at surface
-			2			surface, no fossils 61.0-65.9' - dusky yellow, (5Y 6/4), mild to moderate HCl reaction, weak	(mud) at 7:55 =3/28/07
-	R2-NQ 5 ft	65	0	63.05', 63.4' - Mechanical break		to medium strong (R2 to R3), voids up to 3/16"x3/16" (some infilled with very fine to medium grain	-
-	98%		3			mineralization) voids up to 25% of surface, extremely weak carbonate silt interval from 64.3-64.6' mottled	-
65 -21.1			1	_		gray from 63.5-64.5', very poorly fossiliferous (trace molds)	R2: 12 minutes
-	66.0		NR/		Ш	No Recovery 65.9-66.0'	_
-			0		H	Limestone 66.0-71.0' - Same as 61.0-65.9'	-
-			0		Ħ	except very weak rock (peels with knife over first foot) grades to medium strong over last 3.0' of run,	- -
-	R3-NQ 5 ft	78	6	68.5', 68.6' - Fractures, 50-60 deg, rough, undulating, tight, black particles on surface -68.95' - Bedding plane, <10 deg, top of extremely weak rock		extremely weak rock (compressed by thumb) from 68.95' to 69.15', 10% unfilled spheroidal cavities up to 1/2"x1/2", stratified with black laminations from 69.4-70.8', 5-10% medium grain black particles, some	- -
-	100%		3		Ħ		-
70 -26.1	74.0		1	69.15' - Bedding plane, 40 deg, base of extremely weak rock 69.5' - Bedding plane or mechanical break,	Ħ	voids (<1/16") in lower half infilled     with gray mineral moderately     fossiliferous (casts, molds), up to	R3: 13 minutes Driller's Remark:
-	71.0		>10	horizontal, rough, undulating, tight 70.0' - Fracture, 60-70 deg, rough, undulating, medium black particles		3/8" fragment molds 71.0-71.5' - yellowish gray, (5Y 7/2), moderate to strong HCl reaction, voids (mostly <1/16") up to 45% surface, gray staining, moderately fossiliferous (mold, casts),	Maintaining circulation
-			2	71.15'-71.7' - Fracture zone, fractured rock core black stains on fractures 72.15' - Bedding plane, 0-5 deg, rough,	Ħ		- -
-	R4-NQ 5 ft 94%	72	2	undulating, open 5/8" 72.75' - Bedding plane or mechanical break, horizontal, rough, planar		- 71.0-72.75' and 74.7-75.7' very weak rock (R1) peels with knife, 72.75-74.7' medium strong rock (R3)	- -
75	5.,3		1	73.35'-74.35' - Fracture, rough, planar, no stains, curved fracture 73.95' - Fracture, 40 deg, rough, planar, tight, (bisecting curved fracture)	H	- cannot be scraped with knife 72.5-75.7' - Same as 71.0-71.5' except moderate to strong HCI	- -
-31.1	76.0		0 NR	74.7' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1/2"		reaction - _ <b>No Recovery 75.7-76.0'</b>	R4: 23 minutes
-			2	discontinuity between rock	H	- No Necovery 13.1-16.0	- -
-			1	76.7' - Fracture, 80-90 deg, rough, undulating, tight 76.95' - Fracture, horizontal, rough, undulating, open up to 1"		- -	- -
-	R5-NQ 5 ft 98%	90	1	77.25' - Fracture or mechanical break,		-	- -
80	55,3		1	horizontal, rough, undulating, open 1/2" 79.3' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/2"		-	- -
				, ,			



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724210.1 N, 457702.3 E (NAD83)

 $DRILLING \underline{\ CONTRACTOR: Universal\ Engineering\ Sciences,\ Gainesville,\ FL;\ Driller:\ M.\ Boatright;\ Cathead\ Operator:\ M.\ Griffinnes and Contractors$ ELEVATION: 43.9 ft (NAVD88)

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

ORIENTATION : Vertical WATER LEVELS: 3.0 ft bgs on 3/26/07 START: 3/26/2007 END: 3/26/2007 LOGGER: T. Stewart DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (#) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -36.1 R5: 7 minutes Limestone 2 76.0-80.9' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4), 80.5' - Fracture, 30-40 deg, rough, 81.0 NR undulating, tight moderate to strong HCI reaction, 80.6' - Fracture, 10-15 deg, rough, 2 spherical voids up to 1/16"x1/16" undulating, tight 81.0'-81.2' - Fracture zone covering up to 30% of core surface, 5-10% irregularly shaped cavities up to 1-1/4", no infill, predominantly 0 weak rock (R2), gray mottling of stains at 80.5', zone of brown R6-NC 5 ft 90 0 lamination (very weak rock R1 at 96% 78.35'), moderate olive brown interval from 76.0-76.6' SC-1 collected at 84.2-No Recovery 80.9-81.0' 0 85 15 Limestone 85 Driller's Remark: 100% 81.0-85.8' - dusky yellow, (5Y 6/4),  $-41\overline{1}$ loss of circulation at 84.5' 85.15' - Mechanical break 0 mottled, mottled, irregular shaped R6: 8 minutes cavities infilled with medium gray 86.0 NR (N5) mineral and extremely weak (NS) fillited and extremely weak rock (R0) yellowish gray in color, voids up to 3/16"x3/16", spheroidal cavities covering 15% of the surface of first 2.5" of run, infilled cavities up 86.1' - Bedding plane or mechanical break, 2 horizontal, rough, undulating, open 1/4" 86.3' - Mechanical break or bedding plane, horizontal, rough, undulating, open 1/8"-1/4" 0 to 2"x1/2" over bottom 2.5' of run, entire run moderately fossiliferous R7-NQ 88.05' - Fracture, 15-20 deg, rough, (molds and casts), yellowish gray (5Y undulating, tight 88.35' - Mechanical break, 5-10 deg, rough, 88 2 8/1) clay seam at 83.2' 100% No Recovery 85.8-86.0' planar, black stain, tight Limestone 3 88.5' - Mechanical break 86.0-88.0' - yellowish gray to dusky 90 88.95' - Fracture, 70-80 deg, rough, vellow, (5Y 7/2 to 5Y 6/4), strong HCI -46.1 R7: 12 minutes undulating, black staining reaction, very fine wavy very thinly 89.5', 89.6' - Bedding plane or mechanical 0 bedded (1/16" thick) containing dark 91.0 break, 5-10 deg, rough, planar, black stains, brown and white fossil. voids covering 40-50% of surface, 1"x1/2" cavity infilled with soft gray clay, 1 90.65' - Mechanical break 91.6' - Fracture, 60-70 deg, rough, trace medium grain black particles, undulating, tight medium to highly fossiliferous (casts, 0 molds, mostly whole fossil), weak rock (R2) R8-NQ 88.0-91.0' - Same as 86.0-88.0' 0 5 ft 100 except dusky yellow, (5Y 6/4), very 100% fine grained, weak (R2), poorly fossiliferous (molds, casts, whole 0 fossil), 5-10% black particles, organic 95 bedding/lamination at 89.5-98.0' -51.7 R8: 6 minutes 91.0-96.0' - Same as 88.0-91.0' 0 except discontinuous wavy black lamination at 92.0', highly 96.0 fossiliferous 96.3', 96.85', 96.55' - Fractures (3), 2 96.0-100.9' - Same as 88.0-91.0' horizontal, rough, undulating, tight except highly fossiliferous at SC-2 collected at 96.85-98.5-99.7 0 97.8' R9-NO 88 1 5 ft 98% 98.95' - Fracture, horizontal, rough, 1 undulating, 1/8" relief 100



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724210.1 N, 457702.3 E (NAD83)

ELEVATION: 43.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

CORING	NETHOD A	AD EC	JUIPIV	IENT: CME 550 S/N 186073, mud rotary, NQ tools, HW	casing		ORIENTATION : Vertical
WATER	LEVELS : 3.0	ft bgs	s on 3	/26/07 START: 3/26/2007 END: 3/3	<u> 26/20</u> 0	7 LOGGER : T. Stewart	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-56.1				99.7' - Fracture, 10 deg, rough, undulating,	Ш		R9: 8 minutes
- - -	101.0		2 (NR) 1	open 100.65', 100.75' - Bedding plane, rough, planar, 1/16" relief (bedding plane fracture) 101.2' - Mechanical break 101.25' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/4"		No Recovery 100.9-101.0' Limestone 101.0-106.0' - Same as 88.0-91.0' except highly fossiliferous at 101.3-102.1' and 103.5-104.2'	
_	R10-NQ		0		H	-	
_	5 ft 100%	96	0	103.5', 104.2' - Mechanical break (2)		-	-
105_ -61.1			0	104.25', 104.7', 105.25', 105.65' - Mechanical break (4), horizontal, rough, undulating, tight		- 	R10: 8 minutes
-	106.0		0			106.0-109.0' - yellowish gray, (5Y	
_	-		0	_		<ul> <li>7/2), strong HCI reaction, very weak to weak (R1 to R2), gray mottling, staining over 106.0-109.0', 10-15%</li> <li>spherical voids (&lt;1/16"), poorly</li> </ul>	
_	R11-NQ 5 ft	92	1			fossiliferous (molds mostly casts up to 1/8" in size), 25-30% very fine grain white and dark gray particles	
-	100%	32	2	108.6' - Fracture, 60-70 deg, rough, undulating, tight 109.0' - Bedding plane or mechanical break,		- 109.0-111.0' - Same as 106.0-109.0' - except yellowish gray, (5Y 8/1)	
110 -66.1 -			2	horizontal, smooth, planar 109.8' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/4"			R11: 7 minutes
-	111.0		1	110.2' - Bedding plane or mechanical break, horizontal, smooth, planar, open 1/8" 110.35' - Bedding plane or mechanical break, horizontal south plant by the second second second second second second second second second		111.0-113.0' - yellowish gray, (5Y - 8/1), strong HCl reaction, very weak	
-		2		horizontal, rough, undulating, open up to 5/8" 111.3' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/8" open 111.6' - Mechanical break, <10 deg, rough,		to weak (R1 to R2), up to 10% elongated cavities up to 1/4"x1/2" rimmed with secondary	
-	R12-NQ 5 ft	80	2	undulating, tight  112.0' - Mechanical break, <10 deg, rough, undulating, tight		mineralization, trace fossil casts up to 1/2" - 113.0-116.0' - white, (N9), strong HCI reaction, very weak to weak (R1 to	
- - 115	100%		1	112.9' - Mechanical break or bedding plane, <10 deg, rough, undulating, tight 113.7-113.95' - Fracture zone, rough,	H	R2), mottled with soft white clay, poorly fossiliferous (casts and molds up to 1/4") more larger voids, voids	
-71.1 -	116.0		1	undulating, gray stains, also brown stains 114.4' - Bedding plane or mechanical break, horizontal, rough, undulating, tight		are spheroidal and up to 1/16", no infill	R12: 5 minutes
_			1	115.35' - Bedding plane or mechanical break, rough, undulating, tight to 1/8" gap 116.45' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1/4"		116.0-119.5' - yellowish gray, (5Y - 7/2), strong HCl reaction, very weak to weak (R1 to R2), grades from	SC-3 collected at 115.1- 116.0'
-			5	117.2' - Bedding plane or mechanical break, horizontal, rough, undulating, tight 117.4' - Fracture, 60-70 deg, rough,	H	moderate to highly fossiliferous from 116.0-119.0' (casts, molds) up to 1/2"x1/2" micro fossils, gray staining	
-	R13-NQ 5 ft 100%	72	1	undulating, open 1/8"  117.55' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/8"		predominantly over 117.0-119.0'	
120			2	117.65' - Mechanical break, horizontal, smooth, planar, open 1/8"		-	
	1						

ORIENTATION: Vertical



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-03	SHEET	7	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724210.1 N, 457702.3 E (NAD83)

ELEVATION: 43.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

00.1	- WILLING D 7 ti	10 L	2011 11	TENT . CIVIE 330 3/N 1860/3, HILL TOTALLY, NO TOOIS, HV	Odom	9	ORIENTATION . Vertical
WATER	LEVELS: 3.0	ft bg	s on 3	/26/07 START: 3/26/2007 END: 3	/26/20	07 LOGGER : T. Stewart	
				DISCONTINUITIES	T.,	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		<i>(</i> 0		SYMBOLIC LOG		
N S N	Z'A'∑	_	ı≅⊢	DESCRIPTION		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
필었다	Š튜	(%) <sub>Q</sub>	I <u>5</u> 8	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	$\exists$	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
E # ≸	유호영	۵	PA F	PLANARITY, INFILLING MATERIAL AND	₩	AND ROCK MASS	SMOOTHNESS, CAVING ROD
SGE	8,5,5	S O	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-76.1		_	_	117 0' Mechanical break or hadding plans	Ŧ	Limestone	R13: 7 minutes
-, 0.1			1	117.9' - Mechanical break or bedding plane, rough, undulating, tight		- 119.5-120.5' - Same as 116.0'-119.5'	IX 13. / Hilliutes
	121.0		'	118.25' - Mechanical break or bedding plane,		except grayish yellow, (5Y 8/4), up to	
-	121.0			<10 deg, rough, undulating, tight	1_	25% spheroidal voids (<1/16")	Chalk like or powder like
-			2	119.45' - Mechanical break or bedding plane,	$\bot$	- 120.5-121.0' - Same as 116.0'-119.5'	rock, this run contains rock
			-	<10 deg, rough, undulating, dark gray stains,	$\mathbf{H}$	except yellowish gray, (5Y 8/1), very	with vertical fractures-
_				open up to 1/2"	1	fine grained, trace voids, 15%	possible stress related to
-			0	119.65 - Bedding plane, horizontal		<ul> <li>elongated cavities up to 1/8"x1/2",</li> </ul>	over burden -
				120.3' - Bedding plane or mechanical break,	$\perp$	poorly fossiliferous	_
	R14-NQ			horizontal, rough, undulating, open 1/8" gap	$\perp$	121.0-125.0' - yellowish gray, (5Y	
-	5 ft	75	2	121.75' - Bedding plane or mechanical break,	+	<ul> <li>8/1), strong HCl reaction, very weak</li> </ul>	-
_	80%			horizontal, rough, undulating, tight		to weak (R1 to R2), 10% voids up to	_
			l .	121.85' - Bedding plane or mechanical break,	Ш	1/16", wavy bedded discontinuity 1/2"	
40-			1	horizontal, rough, undulating, tight	1	hick at 122.0', gray staining over	SC-4 collected at 124.5-
125_			$\vdash$	123.05' - Bedding plane or mechanical break, horizontal, rough, planar, tight	+-	entire interval, poorly fossiliferous (casts), trace dark gray very fine	125.0'
-81.1			ND	123.35, 123.55' - Mechanical break		particles, upper most 1' is the same	R14: 5 minutes
I -	126.0		NR	123.9' - Mechanical break, rough, planar,		as the bottom of R13	Driller's Remark: Soft
-	126.0		<b>-</b>	tight	+	No Recovery 125.0-126.0'	drilling at 124.5-125.0' -
I _			1	124.05' - Mechanical break or bedding plane,	$\bot$	Limestone	
			'	smooth, planar, tight		126.0-129.6' - yellowish gray with	
-				126.5' - Mechanical break or bedding plane,	$\perp$	moderate gray staining, (5Y 8/1),	-
_			2	horizontal, rough, planar, open 1/16"	1	strong HCl reaction, 126-128.5' is	_
			-	127.0' - Mechanical break, horizontal, rough,		very fine chalk-like feel, poorly	
_	R15-NQ			undulating, tight	$\top$	fossiliferous (trace casts), 25%	
_	5 ft	52	2	127.3-127.45' - Fracture zone	E	_ spheroidal voids (mostly	-
	72%			128.3' - Mechanical break or bedding plane,	Ш	1/16"x1/16"), trace cavities up to	
_			2	horizontal, rough, undulating, open 1/16"	1	1/2"x1/4"	1
-				128.8' - Mechanical break, horizontal, rough, undulating, tight	+-	128.5-129.6' highly fossiliferous (casts, molds, micro fossil), 20-25%	-
130_				129.02-129.05' - Fracture zone	┵	casts, moids, micro rossir), 20-25% cavities partially filled (rimmed with	
-86.1			NR	129.02-129.03 - Fracture 2011e 129.4' - Bedding plane or mechanical break,		calcite)	R15: 7 minutes
-				horizontal, rough, undulating, tight, assume	1	No Recovery 129.6-131.0'	Driller's Remark: Soft lense -
_	131.0			core loss from bottom of run	+		from 127.0-128.0'
						Limestone	Appears similar to 90-115',
_			>10			- 131.0-135.0' - Same as 126.0-128.5' except bottom most 0.5' returns to	a vertical fracture in this interval is over 1.5' long
-				122 0' Machanical brook harizontal rough	+-	"clean" un-stained yellowish gray (5Y	Interval is over 1.5 long
			>10	132.0' - Mechanical break, horizontal, rough, planar, for horizontals, vertical stained set of	$\perp$	- 8/1)	_
			10	fractures at 132', 80-100% surface covered.		<i>⊶</i> .,	]
I -	R16-NQ			1140ta100 at 102, 00 100/0 3allace coveled.		<del> </del>	-
I -	5 ft	10	>10		$\perp$	<b>L</b>	1
	80%	. •			$\vdash$		
I -					1	F	1
-			2		七	-	-
135			L_		┲		
-91.1				_	$\perp$	No Recovery 135.0-136.0'	R16: 7 minutes
-			NR		+-	<del>-</del>	
I _	136.0					_	
						Limestone	
-			0		1	- 136.0-137.45' - light olive gray, (5Y	-
I -			<u> </u>		+	6/1), strong HCl reaction, strong	-
					$\vdash$	(R4), wavy black mineralization laminae, trace cavities up to 1-1/2"	
I -			>10	137.45' - Bedding plane, 15-20 deg, brownish	T		1
-	D47.10		<u> </u>	black stains, tight	+	long -	-
	R17-NQ 5 ft	64	>10	137.8-138.15' - Fracture zone, up to 2"	$\perp$		
I -	96%	04	- 10	subrounded pieces	$\vdash$		1
-	90 /0		<b>—</b>	138.35' - Fracture or mechanical break,	+	<del> </del>	
_			2	70-80 deg		-	
140							
				-	1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-03	SHEET	8	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724210.1 N, 457702.3 E (NAD83)

ELEVATION: 43.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

WATER	LEVELS: 3.0	) ft bg:	s on 3	/26/07 START : 3/26/2007 END : 3/2	26/20	07 LOGGER : T. Stewart	
≥ ∩ ⊕	6)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-96.1 - - -	141.0		1 NR 1	138.5-138.75' - Fracture zone, brownish black stains 139.35' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1/2" 139.55' - Fracture or mechanical break, 40-50 deg, rough, undulating, open up to 1/2"		Limestone  137.45-140.8' - white to yellowish gray, (N9 to 5Y 8/1), strong (R4), voids up to 1/16"x1/16" over 25% of surface, cavities up to 2"x1-1/2" irregularly shaped filled with a weak	R17: 8 minutes  Stopped drilling at 141.0' on 3/28/07 Starts drilling from 141.0' on 3/29/07, 08:01 water
-	R18-NQ 5 ft 100%	88	0	140.25' - Mechanical break or bedding plane, horizontal, rough, undulating 141.35' - Bedding plane, horizontal, rough, undulating, 1/16" clay infilling, open1/8" 142.8' - Bedding plane or mechanical break, <10 deg, rough, undulating, tight to 1/4" open		secondary mineral, poorly to moderately fossiliferous (casts, molds), fossils up to 3/4" No Recovery 140.8-141.0' Limestone 141.0-146.0' - light olive gray, strong	level to 3'10" below ground surface in NQ barrel
145 -101.1 -	146.0	0 2		143.4', 143.5', 143.85', 144.15', 144.55' - Mechanical break (5), horizontal, rough, undulating, tight 144.55' - Bedding plane or mechanical break, horizontal, rough, undulating, tight  145.8' - Bedding plane or mechanical break,		HCI reaction, weak (R2), 5-10% spherical voids up to 1/8"x1/8" laminated rim <1/16" thick over entire interval, trace cavities up to 3/8"x1/16" elongated with secondary white mineral rimmed (60% infill), bottom most 0.15' is a very light gray	R18: 9 minutes
-			0	<ul> <li>145.8' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/8" gap between weaker rock above and stronger rock below</li> <li>147.55' - Bedding plane or mechanical break, horizontal, rough, undulating, tight</li> </ul>		medium strong (R3) limestone 146.0-148.5' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine grained, strong HCl reaction, medium strong to strong (R3 to R4), voids up to 3/16"x1/8" covering	
- - 150 106.1	150 106.1 - 151.2		1	148.05', 148.5', 149.4' - Bedding plane or mechanical break (3), horizontal, rough, planar, 148.5' has organic black infill <1/16" thick		20-30% of surface, trace cavities elongated horizontally 1"x1/4" in size, trace fossil (casts/molds) 148.5-149.45' - very weak (R1), stratified section of yellowish gray and brownish black lamination, rock	SC-5 collected at 148.5- 149.45' -
-106.1 - - - -			0	- - - - -		has powdery feel to touch 149.45-151.2' - fine grained, very thinly bedded, voids up to 1/8"x1/8", some infilled with white mineralization, rock has powdery feel to touch Bottom of Boring at 151.2 ft bgs on 4/3/2007	R19: 10 minutes Driller's Remark: Circulation loss has been continuing (60-100%) during core runs, total depth tape measured at 151.0', borehole open to total depth
- - -				- - -		- - - -	- - - -
- - -				- - -		-	- - - -
-				-		-	- - -



PI	ROJECT NUMBER:	BORING NUMBER:					
13	338884.FI	B-04	SHEET	1	OF	Q	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724317.2 N, 457809.8 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS	: 3.0 ft bo	as on 4/10	)/07	START : 4/10/2007
300				STANDARD	SOIL DESCRIPTION COMMENTS
N N N	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR  MOISTURE CONTENT, RELATIVE DENSITY OR  DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
42.8	0.0				Topsoil  Samples taken using 5' sections of N-rod, 3-
		1.1	SS-1	1-2-2 (4)	\ 0.0-0.15' - brownish black, (5YR 2/1), moist, 30-35% / - 7/8" tricone drag bit, 50 lb bags of quick gel brand bentonite
-	1.5			. ,	Poorly Graded Sand With Organics (SP) 0.15-1.1' - grayish black to very light gray, (N2 to N8),
-	_				\moist, very loose, very fine to fine grained, silica sand, \
-	-				trace nonplastic fines, 10% organics decreasing with depth
-	-				<del>``</del>
-	1				
-					
5	5.0				1
37.8	0.0				Poorly Graded Sand (SP)
-	1	1.0	SS-2	2-2-2 (4)	5.0-6.0' - grayish orange to pale yellowish brown – mottled with trace dusky brown, (10YR 7/4 to 10YR
	6.5			( · /	6/2 with 5YR 2/2), wet, very fine to fine grained, trace to 3% nonplastic fines, trace very fine sand-sized
_					black particles, silica sand
-	-				
-	-				
-					
-	1				
10	10.0				
32.8	10.0				Poorly Graded Sand To Clayey Sand (SP-SC)
-	1	0.9	SS-3	4-6-7 (13)	10.0-10.9' - yellowish gray, (5Y 7/2), wet, very fine to fine grained, grading from sand (SP) to clayey silt
	11.5			(13)	(SC) with depth, trace nonplastic fines in SP, 25-30% / low to medium plastic fines in SC, trace of angular -
					shaped black particles
_					_
-	-				
-	1				
-	1				-
15	15.0				
27.8	13.0				Silty Sand (SM)
-	1	1.2	SS-4	7-10-12 (22)	15.0-16.2' - yellowish gray, (5Y 7/2), wet, medium dense, very fine to fine grained, 25-30% nonplastic
	16.5			(44)	fines, very fine black particles, 3/8" thick vertically oriented seam of SP as above (10.0-10.9'), trace
					\moderate yellow (5Y 7/6) staining over last 1/3 of /
-	_				\sample, silica sand
-	-				
-	-				
-	-				-
20	-				-
20					<del>                                     </del>



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-04	SHEET	2	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724317.2 N, 457809.8 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS	: 3.0 ft b	gs on 4/10	0/07 8	START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb
				STANDARD	SOIL DESCRIPTION COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	
ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
22.8	20.0			(14)	Silty Sand (SM)
-		1.2	SS-5	9-10-9	20.0-21.2' - yellowish gray, (5Y 7/2), wet, very fine to fine grained, 14% nonplastic fines, trace very fine
-	21.5			(19)	angular black particles, silica sand
-	21.5				1
-					<b>†  </b>
-					1
					1
					]
					<b>]  </b>
25	25.0				
17.8				5-6-5	☐ Clayey Sand (SC) ☐ 25.0-25.1' - dark yellowish orange, (10YR 6/6), moist,
_		1.3	SS-6	(11)	∖very fine to fine grained, 30-35% medium plastic ∫
_	26.5				Sandy Fat Clay (CH)
-					25.1-25.4' - greenish gray, (5GY 6/1), moist, stiff, medium to high plasticity, no to slow dilatancy, 30%
-					∭fine silica sands laminated with very light gray (N8), ∭ ┪
-					very fine to fine silica sands about 1/6" thick, light brown (5YR 5/6) laminations <1/16" thick
-					Fat Clay (CH)
-					25.4-25.7' - grayish black, (N2), moist, high plasticity, no dilatancy
30	30.0				Silty Sand (SM) 25.7-26.0' - light brown, (5YR 5/6), wet, fine to
12.8					medium grained, strong HCl reaction, 25-30% low
		1.4	SS-7	7-11-41 (52)	plastic fines carbonate derived 7/8" tricone roller bit Silty Sand (SM)
_	31.5			` ,	_
_					medium grained, strong HCl reaction, 25% nonplastic
_					Silty Sand With Gravel (SM)
-					yellowish gray staining, (5Y 8/1 with 5Y 7/6 and 5Y │ ┛ ┃
-					
-					fines, 20% fine to coarse gravel, all carbonate
25 -	25.0				
7.8	35.0				Interbedded Silt With Sand (ML)
-		1.5	SS-8	3-4-14	35.0-36.5' - medium light gray mottled with medium   -┃┃┃┃┃
-	36.5			(18)	with yellowish gray, (N6 mottled with N4 interbedded
-	- 55.5				with 10YR 8/2 mottled with 5Y 8/1), moist, low plasticity, strong to very strong HCl reaction, 20-25%
					\very fine to fine grained sand, 1" angular limestone / T
					Inaginents at bottom of sample
					] [
-					<b>.</b>
_					<b>]</b>
40					
- - - - - -	35.0 36.5	1.5	SS-8	3-4-14 (18)	medium grained, strong HCl reaction, 25% nonplastic fines, pockets of yellowish gray (5Y 8/1) material  Silty Sand With Gravel (SM) 30.0-31.4' - yellowish gray with moderate yellow and yellowish gray staining, (5Y 8/1 with 5Y 7/6 and 5Y 7/2), wet, fine to coarse grained, strong HCl reaction, angular to subrounded sand-sized, 23% low plastic fines, 20% fine to coarse gravel, all carbonate  Interbedded Silt With Sand (ML) 35.0-36.5' - medium light gray mottled with medium dark gray interbedded with very pale orange mottled with yellowish gray, (N6 mottled with N4 interbedded with 10YR 8/2 mottled with 5Y 8/1), moist, low plasticity, strong to very strong HCl reaction, 20-25%



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-04	SHEET	3	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724317.2 N, 457809.8 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS	: 3.0 ft bo	gs on 4/10	0/07	START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb
300				STANDARD PENETRATION	SOIL DESCRIPTION © COMMENTS
TEST RES					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
H BE		RECOVE	ERY (ft)		MOISTURE CONTENT, RESTS, AND
DEPJ SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
2.8	40.0				Silt With Sand (ML)
-	1	1.4	SS-9	5-5-9 (14)	40.0-41.4' - light gray mottled with yellowish gray, (N7 -
	41.5			( ,	very strong HCl reaction, 20% very fine to fine sand,
_					-
-					
-	-				
-	-				
-	1				
45	45.0				
-2.2	10.0				Elastic Silt With Sand And Limestone Fragments
		1.5	SS-10	6-10-14 (24)	(MH) 45.0-46.5' - medium light gray, (N7), wet, low to
_	46.5				medium plasticity, rapid dilatancy, very strong HCl reaction, 25% fine to medium grained sand, 10-15%
-	-				fine to coarse grained gravel limestone fragments, all
-	-				
-	-				
-	1				
-	1				
50	50.0				1
-7.2				47.47.40	Silty Sand (SM) 50.0-51.0' - medium gray, (N5), wet, dense, fine to
_		1.0	SS-11	17-17-18 (35)	coarse grained, very strong HCl reaction, till
-	51.5				predominantly fossils including shell fragments, 20%
-					
-					
-					
-					
					]
55	55.0				
-12.2				15-24-33	Sandy Silt (ML) 55.0-56.5' - very light gray, (N8), wet, low plasticity,
-	-	1.5	SS-12	(57)	rapid dilatancy, very strong HCl reaction, 30% fine to
-	56.5				├_ ranging from yellowish gray to medium dark gray (5Y     /
-	-				\\\ \( \frac{5/1 \text{ to 5Y 8/1}}{\} \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-	1				
-	1				
	]				] [
					] [
60_					



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-04	SHEET	4	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724317.2 N, 457809.8 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

ORIENTATION: Vertical

DRILLIN	DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION: Vertical									
WATER	<u>LEVELS</u>	: 3.0 ft bo	gs on 4/10	)/07 S	TART : 4/10/2007					
				STANDARD	SOIL DESCRIPTION COMMENTS					
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPI F	INTERVA	L (ft)	PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION					
SEL( ON	DECOVEDY (ft)			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,					
ATI		RECOVE	KY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND					
	[ #TYPE   6"-6"-6"				CONSISTENCY, SOIL STRUCTURE, MINERALOGY					
	00.0			(N)	Silty Sand With Gravel (SM)    10:58 Driller's Remark: Change mud vat,					
-17.2	60.0			28-27-24	60.0-61.5' - medium light gray, (N6), wet, very dense,					
		1.5	SS-13	(51)	fine to coarse grained, very strong HCl reaction,					
	61.5			(- /	predominantly fossil fragments, 25-30% low to					
1 -					medium plastic fines, 15% fine gravel-sized fragments ————————————————————————————————————					
-					- Composed of Shale Haginetics					
-										
-					4 1					
I _					<b>_</b>					
]					<b>1</b>					
GF -	65.0				<b>†  </b>					
-22.2	65.0			37-50/4.0	Silty Sand (SM)					
	65.8	0.8	SS-14	37-50/4.0 (87/10")	65.0-65.8' - very light gray to light gray mottled with					
-	55.0			, , ,	medium gray, (N8 to N2 mottled with N5), wet, very					
					dense, fine to coarse grained, very strong HCl reaction, fossil fragments and carbonate material.					
					43% low to medium plastic fines, 10-15% fine					
-					gravel-sized fragments					
-					11					
-										
-										
_					<b>.</b>					
70	70.0				11					
-27.2					Silty Sand (SM)					
-		1.5	SS-15	24-26-30	70.0-71.5' - Same as 65.0-65.9'					
-		1.5	33-13	(56)	<b>-</b>					
-	71.5									
					] ]					
					<b>1</b>					
-					<b>1</b>					
-					<b>-    </b>					
-					<b>-                                     </b>					
-					<b>.</b>					
75	75.0									
-32.2					Clay With Sand (CL)					
		1.5	SS-16	11-12-15	75.0-75.8' - grayish green mottled with grayish green and brownish black, (10GY 5/2 mottled with 10G 4/2					
-	76.5	-		(27)	and 5Y 2/1), moist, very stiff, high plasticity, no					
-	76.5				¬∖ dilatancy, mild HCl reaction, 25% very fine to fine					
-					\silica sand; irregular shaped, laminated bedding;     brownish black material may be organics					
_					Elastic Silt With Sand (MH)					
					75.8-76.5' - yellowish gray, (5Y 8/1), moist to wet, low					
1 7					to medium plasticity, rapid dilatancy, mild HCl					
-					reaction, 25% fine silica and carbonate sands, 1-1/2" lens of sandy fat clay at bottom of sample, same as					
1 -					75.7-75.8'					
-					4					
80										
1					<b>   </b>					



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-04	SHEET	5	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724317.2 N, 457809.8 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS	: 3.0 ft bo	gs on 4/10	0/07 S	START : 4/10/2007
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE INTERVAL (ft)  RECOVERY (ft)  #TYPE 6"-6" (N)  STANDARD PENETRATION TEST RESULTS  SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY			OUL NAME LIGOR OPPOUR OVARDOL OCI OR	
A BE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
EPTI SURF,			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
-37.2	80.0			18-50/4.5	Clayey Sand (SC) /// 14:29 Driller's Remark: Observed hard
-	80.9	0.9	SS-17	(68/10.5")	80.0-80.9' - light olive gray mottled with dusky yellow drilling light rig bouncing green, (5Y 5/2 mottled with 5BG 3/2), wet, very dense,
-					fine grained, predominantly clayey sand (SC) with pockets of clay (CH) and silt (ML), 35% medium
					plastic fines, mild HCl reaction, silica sand
_					CH- dusky blue green, (5BG 3/2), with very shiny appearance, no HCl reaction
_					ML- yellowish gray (5Y 8/1), same as 45.0-46.5', mild HCl reaction, olive gray (5Y 2/1) organic pockets at
-					bottom of sample, high plastic, no HCl reaction
-					-
85	85 N				<b> </b>
-42.2	85.0 85.2	0.1	SS-18	50/2	Limestone Fragments  14:49 Driller's Remark: Light rig bouncing
				(50/2")	\ 85.0-85.1' - light olive gray, (5Y 5/2), moderate to \ / - over entire 5-foot run to 90' \ strong HCl reaction, organic fragments
_					<b>-</b>
_					<b> </b>
-					-
-					
-					<b> </b>
90	90.0				<b>1</b>
-47.2	90.3	0.3	SS-19	50/4 (50/4") /	Silt (ML)  \[ 90.0-90.3' - yellowish gray mottled with medium dark   -
_				(30/4)	∖ gray, (5Y 7/2 mottled with N4), moist, low plasticity,
_					\rapid dilatancy, strong HCl reaction, brownish black
-					carbonate derived
-					
-					<b> </b>
-					<b> </b>
					]
95	95.0				
-52.2	0=0	0.7	SS-20	40-50/4.5 (90/10.5")	Sandy Silt (ML) 95.0-95.7' - yellowish gray, (5Y 8/1), wet, low
-	95.9			(00/10.0)	plasticity, rapid dilatancy, strong HCl reaction, 25-30%
-					sand, all carbonate derived
-					
-					
					] [
_					] ]
-					<b> </b>
100					<del>                                     </del>



PROJECT NUMBER:	BORING NUMBER:			
338884 FI	R-04	CHEET	6 OE 8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724317.2 N, 457809.8 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

ORIENTATION: Vertical

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION: Vertical										
WATER	LEVELS	: 3.0 ft bo	gs on 4/10	0/07	START : 4/10/2007 END : 4/17/2007 LOGO	SER	: R.	McComb		
					SOIL DESCRIPTION	П		COMMENTS		
종무 <u>을</u>	SAMDI E	INTERVA	I (ft)	STANDARD PENETRATION		$\dashv$	SYMBOLIC LOG			
DEPTH BELOW SURFACE AND ELEVATION (#)	SAWIFLE			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		101	DEPTH OF CASING, DRILLING RATE,		
A CE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		OL	DRILLING FLUID LOSS, TESTS, AND		
FF.F.			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		ΛME	INSTRUMENTATION		
BS I				(N)			S			
-57.2	100.6	0.3	SS-21	50/4	Sandy Silt (ML)	$\Box$		16:10 Driller's Remark: Last sample of		
_				(50/4")	100.0-100.3' - Same as 95.0-95.7' except limestone lens 0.1' thick at bottom of sample	/1		4/10/07, end of drilling - 08:15 Water level at 2.5' below ground		
-					lens o. i thick at bottom of sample	⁄ ┨		surface on 4/11/07		
-						- 4		4/11/07 Adding 5' sections of AWJ to reach		
I _						J		depth		
_						- 1		1		
-						Ⅎ		-		
-						-4		-		
						J				
								]		
105	105.0					- 1		1		
-62.2	100.0			44 50/5 5	Silt With Sand (ML)	$\dashv$	ш	09:44 Starting drilling to 105' added 1/2 bag		
-		8.0	SS-22	41-50/5.5 (91/11.5")	105.0-105.8' - yellowish gray mottled with gray, (5Y	4		bentonite -		
_	106.0			(6.11118)	¬ 8/1 mottled with N5), moist, low plasticity, rapid	巾	ш			
					dilatancy, strong HCl reaction, 20% fine to medium grained sand, trace wafer shaped limestone lenses					
1 -					\\ <1/8" thick, one 1/2" dark yellowish orange coarse	/1		1		
-					fragment, all carbonate	/ 1		1		
-						′ -{		-		
I -						-4		4		
						J				
1 -						- 1		1		
						Ⅎ		-		
110 <u></u> -67.2	110.0				Silty Sand (SM)	$\dashv$	717	10:26 Drillor's Domark: 22 E0/E" (92/11")		
-07.2		0.8	SS-23	33-50/5	110.0-110.8' - yellowish gray, (5Y 8/1), wet, fine to			10:36 Driller's Remark: 33-50/5" (83/11")  Add 1/2 bag bentonite to mud vat		
	110.9			(83/11")	coarse grained, strong HCl reaction, 10-15% fine	$\mathcal{A}$	Ш	riad 1/2 bag boritorine to mad vat		
1 7					\ gravel-sized, 25-30% low to medium plastic fines, all	/1		1		
-					\carbonate	/ ┨		1		
-						- 1		-		
I -						4		4		
						J		]		
						7		1		
-						- 1		1		
-						$\dashv$		-		
-						4				
115_	115.0					_	741			
-72.2					Sandy Clay With Silt (CL-ML)	ŀ				
		1.5	SS-24	1-1-3	115.0-116.5' - olive gray mottled with greenish black, (5Y 4/1 mottled with 5GY 2/1), low plasticity, slow	7		1		
-	440 -			(4)	dilatancy, moderate to strong HCl reaction, 15-20% of					
-	116.5				clay is fine to coarse grained sand; fossils and fossil	<b> </b>	ИЦ			
-					fragments; the clay is irregularly interbedded with 30%	· / 🗐				
					\light olive gray (5Y 6/1) fine grained, poorly graded silica sand (SP)					
1 7					Silica satiu (Si )	<sup>,</sup> ]		1		
-						- 1		1		
-						$\dashv$		-		
-						4				
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120								]		
						$\dashv$				



PROJECT NUMBER:	BORING NUMBER:					
338884 FI	B-04	SHEET	7	OF	R	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724317.2 N, 457809.8 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER LEVELS: 3.0 ft bgs on 4/10/07					START : 4/10/2007 END : 4/17/2007	LOGGER	: R.	McComb
				STANDARD	SOIL DESCRIPTION		ى ق	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	RECOVE		PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COI MOISTURE CONTENT, RELATIVE DENSIT CONSISTENCY, SOIL STRUCTURE, MINERA	YOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
-77.2 - - - - - -	120.0	0.3	SS-25	50/5 (50/5")	Silt With Sand And Limestone Fragments (in 120.0-120.3' - yellowish gray, (5Y 8/1), moist, HCl reaction, 50% limestone fragments, 20% (medium sand-sized material, all carbonate)	, strong /-		- - - - - -
-125 -82.2 	125.0	0.2	SS-26	50/3 (50/3")	Silt (ML) 125.0-125.2' - yellowish gray, (5Y 8/1), moist, plasticity, rapid dilatancy, strong HCl reaction fine to medium sand-sized, all carbonate	- low		- - - - - - - - -
-30 -87.2 	130.0	0.3	SS-27	50/3 (50/3")	Silt With Sand (ML)  130.0-130.3' - Same as 125.0-125.2' except 2 fine to coarse sand-sized material	20-25%		14:20 Driller's Remark: Light rig chatter at 133.5', 131.5'
135 -92.2 - - - - - - - - - - - - - 140	135.9	0.1	\SS-28 <i>)</i>	50/1 (50/1")	Limestone Fragment 135.0-135.1' - yellowish gray, (5Y 7/2), mode strong HCI reaction, trace olive gray (5Y 3/2) fossil casts, fragment is a 1" disc shaped Begin Rock Coring at 136.0 ft bgs See the next sheet for the rock core log	rate to staining, -		15:02 Driller's Remark: Will switch to NQ coring, last soil sample for B-4 boring
							l	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-04	SHEET	8	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724317.2 N, 457809.8 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER LEVELS : 3.0 ft bgs on 4/10/07 START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb									
≥∩ ∷	6)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q D	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
-	136.0	<u>«</u>	2	136.5, 136.9' - Fractures (2), horizontal, rough, undulating	S II	Limestone 136.0-137.35' - light olive gray, (5Y 5/2), fine to medium grained, strong HCl reaction, medium strong (R3),	4/12/07 Start coring at 09:40:15 from 136-141' – The interval from 135.0- 136.0' was drilled down to		
-	R1-NQ 5 ft 92%	74	1	137.3' - Fracture or bedding plane, horizontal, smooth 137.35' - Fracture, horizontal, smooth 137.8, 138.5' - Fractures (2), horizontal, rough, undulating		<ul> <li>voids (&lt;1/16") on 20% of surface, cavities (3/16" - 1-3/4"), secondary crystallization in 35-40% of surface, fossiliferous</li> <li>137.35-137.39' - light olive gray, (5Y 5/2), very fine grained, moderate to</li> </ul>	set a 5' stroke; no data for 135.0-136.0' is available 07:45 Water level at 7' 10"		
-140 -97.2 -	141.0		2 NR			mild HCl reaction, extremely weak (R0), fine wavy laminations     137.39-140.6' - yellowish gray, (5Y - 7/2), fine to medium grained, strong to extremely strong HCl reaction, weak to medium strong (R2 to R3),	R1: 25 minutes - R2-NQ is the first run on		
-			>10	141.6-142.6' - Fracture zone, 70-80 deg, rough, <20 deg at 142.6' and 146.6', rough, undulating		weaker with depth, voids (<1/16") on <5% of surface, irregular laminations, powder feel increases with depth, shell fragments, fossiliferous (casts, molds)	4/17/07 - 08:45 Water level at 6.5' below ground surface -		
- - 145	R2-NC 5 ft 98%	78	0	143.1, 143.5' - Mechanical break (2)  144.0' - Mechanical break or bedding plane, horizontal, open 3/8", clay infill, very soft		No Recovery 140.6-141.0' Limestone 141.0-145.9' - transition from yellowish gray to light olive gray, (5Y 8/1 to 5Y 5/2), fine to medium grained, extremely strong HCI	- -		
-102 <u>.2</u> -	146.0		2 (NR)	145.45' - Fracture or mechanical break, 50-60 deg, rough, undulating, black staining on 70% surface		reaction, very weak to weak (R1 to R2), fines increase with depth, voids (<1/16") over 40-50% of surface, fossiliferous casts and molds mainly in weaker rock 144.0-145.9', dark	R2: 8 minutes -		
- - - - - - 150	R3-NQ 5 ft 72%	19	2 5 4	145.75' - Bedding plane or fracture, vertical, rough, undulating, black stains on 60-70% of surface, tight 146.1, 146.2, 146.45, 146.55' - Mechanical break or bedding plane (4), rough, undulating, tight, broken along wavy bedded laminations, organic beds (<1/16") 147.05' - Fracture or bedding plane, horizontal, rough, undulating, open 1/8", black stains over 25% of surface 147.4' - Fracture, 20-30 deg, rough,		gray stains at 144.5' No Recovery 145.9-146.0' Limestone 146.0-149.6' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), voids to <1/16" over 20% of rock, black organic staining, secondary crystallization in voids, poorly fossiliferous (casts/molds)	Driller's Remark: Loss of circulation 100% at 146.5' - SC-1 collected at 147.35- 148.4' -		
-107.2 -107.2 - - - - - - -	151.0		NR	147.4 - Fracture, 20-30 deg, rougn, undulating, black staining over 100% of surface, open 1/32"  148.5' - Fracture, 40 deg, rough, undulating, 100% black staining, tight  148.55' - Fracture or mechanical break, rough, undulating, black staining over 100% of surface, tight  148.7, 148.8, 149.0' - Mechanical break or bedding plane (3), rough, undulating, tight to open 1/16"  149.15' - Fracture or mechanical break, horizontal, black stains on 80% surface, open 1/4"-1/2"  149.45' - Fracture or mechanical break, 40-50 deg, rough, undulating, tight  149.55' - Mechanical break or bedding plane, horizontal, rough, undulating, open 1/2"- 5/8"	-	- No Recovery 149.6-151.0' - Bottom of Boring at 151.0 ft bgs on 4/14/2007	R3: 4 minutes End of B-4 boring at 151.0' - below ground surface on 4/17/07		



PROJECT NUMBER:	BORING NUMBER:	
338884.FL	B-04A	SHEET 1 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724269.5 N, 457868.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

WATER	LEVELS	: 25.0 ft b	ogs on 6/	14/07	START : 6/12/2007 END : 6/13/2007 LOGGER	: A.	Teal
				STANDARD	SOIL DESCRIPTION		COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		COC	
ACE TION		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
42.0	0.0			(14)	Poorly Graded Sand Grading To Poorly Graded		"Water level is based on Ground Water
-		1.3	SS-1	1-2-3	Sand With Silt (SP)  - 0.0-1.3' - light gray grading to dark yellowish orange,		Monitoring at LNP site (FSAR Table - 2.4.12.08)"
-	1.5			(5)	(N7 to 10YR 6/6), moist, no HCl reaction, trace to		
-	1.0				10-15% nonplastic fines, very fine to fine silica sand, /- trace roots		-
_							_
_					_		_
-					_		=
5 37.0	5.0				Silty Sand (SM)	7.77	Sand in 5.0-5.3' may be pyrite
-		0.9	SS-2	3-6-7	5.0-5.3' - black with orange staining, matrix is dark	///	
-	C.F.	0.9	33-2	(13)	yellowish orange, (10YR 6/6), wet, loose, no HCl reaction, predominantly coarse sand to 3/16", 20%		-
-	6.5				nonplastic fines, angular to rounded sand Clayey Sand (SC)		-
-					5.3-5.6' - dusky yellow green, (5GY 5/2), moist, no		<del>-</del>
-					HCI reaction, very fine to fine silica sand, 35% stiff clay with medium to high plasticity		-
					Silt With Sand (ML)		
_					5.6-5.9' - yellowish gray, (5Y 8/1), wet, nonplastic, mild HCl reaction, 15-20% very fine sand-sized,		_
_					carbonate material, trace fine to medium black sand-like 5.0-5.3' (possibly pyrite)		Driller's Remark: change at 9.0'
10 32.0	10.0				, , , ,	1111	_
32.0				9-8-7	Silt With Sand (ml) To Silty Sand (SM)	44.1.	-
-		0.4	SS-3	(15)	dense, very fine to fine grained, mild to moderate HCI reaction, nonplastic fines, carbonate material, sample		-
-	11.5				is 50% ML and 50% SM, trace black sand		-
-					-		-
-					†		-
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-					1		]
					1		_
15	15.0						
27.0				2-3-11	Silty Sand (SM) 15.0-16.0' - yellowish gray, (5Y 8/1), with mottling and		
-		1.0	SS-4	(14)	streaking, wet, nonplastic, mild to moderate HCI \text{reaction, 51% fine sand, trace fine gravel-sized}		_
-	16.5				(limestone) fragments, carbonate material		_ Driller's Remark: 10-15% circulation loss at
-					-		16.5' -
-					-		-
-					-		-
-					1		-
-					†		-
20					1		7



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	B-04A	SHEET	2 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724269.5 N, 457868.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

						ary, carriedu, invv 1005, 5-7/				ONIENTATION : Vertical
WATER	LEVELS	: 25.0 ft b	ogs on 6/	14/07	START : 6/12/2007	END : 6/13/2007	LOGO	GER	: A.	
200				STANDARD		SOIL DESCRIPTION			g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COUL NIAM	AE LICOC ODOLID OVIMBOL			SYMBOLIC LOG	DEDTIL OF CACINIC DRILLING DATE
불분		RECOVE	RY (ft)			IE, USCS GROUP SYMBOL E CONTENT. RELATIVE DE			OLK	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
FF FF			#TYPE	6"-6"-6"		ICY, SOIL STRUCTURE, M			MB	INSTRUMENTATION
ESE ESE				(N)					S	
22.0	20.0			00 00 10	Silty Sand (SN	<b>/I)</b> lle yellowish gray, (5Y 8/1)	wet dense			Blind drill to 20.0' after moving drill rig due to split spoon shoe lost in previous hole
		0.7	SS-5	22-22-12 (34)	nedium to coa	arse grained, mild HCI rea	ction, 45%	Н	Нŀ	Begin SPTs at 20.0'. Each of the following
	21.5			(0.)	\nonplastic fine	s, carbonate material		]		samples belong to the redrilled hole B-04A.
-								1		_
-								_		-
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-								-		<del>-</del>
-								-		-
-								-		-
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25	25.0			50/5 F	0:11: (1.11.)					_
17.0	25.5	0.4	SS-6	50/5.5 (50/5.5")	Silt (ML)  ☐ 25.0-25.4' - gra	ayish orange, (10YR 7/4),	wet.	H	Щ	
l _				(00,010)	nonplastic, mile	d to moderate HCl reaction	n, trace to			_
_						edium sand-sized materia and trace fine sand-sized				
					material, carbo		green			
								_		
-										_
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-								-		-
								-		-
30 12.0	30.0				Silt With Sand	1 (MI)			ш	_
-			00 -	13-8-3	30.0-30.6' - gra	ayish orange, (10YR 7/4),		Д		-
_		0.6	SS-7	(11)	nonplastic, mile	d HCI reaction, up to 25% ized material decreasing	fine to	/-		_
_	31.5				carbonate mate		with depth,	/ 4		_
_								<u> </u>		_
_										
_										
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-								1		-
35	2 <u>F</u> 0							-		-
7.0	35:P	0.0	\ SS-8 /	50/1.5	No Recovery 3	35.0-35.1'		$\forall$		Driller's Remark: some chatter at 35.0-36.0'
-				(50/1.5")				´ +		-
-								-		-
-								-		-
-								-		-
-								-		_
-								_		Dellada Barradu arraadi 10000
_										Driller's Remark: smooth at 38.0'
l _										
40										1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-04A	SHEET	3	OF	a	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724269.5 N, 457868.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

						ary, cameau, invv rous, 5-7/6			ONIENTATION : Vertical
WATER	LEVELS	: 25.0 ft k	ogs on 6/	14/07	START : 6/12/2007	END : 6/13/2007	LOGGEF	₹ : A.	
200		STANDARD SOIL DESCRIPTION  SAMPLE INTERVAL (ft) PENETRATION PENETR						g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	COU NAM	IE LICOS ODOLID OVIMBOL	001.00	SYMBOLIC LOG	DEDTIL OF CACINIC DUILLING DATE
불분		RECOVE	RY (ft)		MOISTURE	IE, USCS GROUP SYMBOL E CONTENT, RELATIVE DE	, COLOR, NSITY OR	Ö	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EVA			#TYPE	6"-6"-6"		ICY, SOIL STRUCTURE, MII		₩	INSTRUMENTATION
SUB				(N)					
2.0	40.4	0.4	SS-9	50/5 (50/5")	Silt With Sand	<b>i (ML)</b> ve gray, (5Y 4/1), wet, non	plastic to low /-	Ш	Driller's Remark: 35.0-40.0' fairly hard
				(30/3)	plasticity, mild	to moderate HCl reaction,	20-25% very		
					fine sand, carb	onate material		1	1
_							-	1	1
-							-	1	-
-							-	1	-
-							-	1	-
-							-	1	-
-							-		_
_									_
45	45.0 45.2								
-3.0	45.2	0.1	SS-10	50/2.5	Limestone Fra	<b>agments</b> ve gray, (5Y 4/1), mild HC		H	
				(50/2.5")	few limestone f	fragments and silt as in 40	0.0-40.4'	1	1
-					(			1	1
-							-	1	1
-							-	1	1
-							-	┨	-
-							-	┨	-
-							-	1	-
_							-	l I	_
_							-	1	_
50	50.0								_
-8.0			00.44	48-50-50/1	Silty Sand (SM	<b>/I)</b> ve gray mottled with light g	rov (EV 4/1		Driller's Remark: drilling remains fairly hard
	51.1	1.0	SS-11	(100/7")	mottled with 5Y	Y 6/1), wet, very dense, fin	e to coarse		
	31.1				grained, moder	rate HCI reaction, 30-40%	low plastic		1
_					\fines, carbonat	te material		1	1
-							-	1	-
-							-	1	-
-							-	ł	-
-							-	┨	-
-							-		-
_							-		_
55	55.9							<u> </u>	
-13.0		0.1	SS-12	50/1 (50/1")	Limestone Fra	<b>agments</b> ve gray, (5Y 4/1), mild to n	noderate HCI		A few limestone fragments and silt
				(30/1)	reaction, limest	stone fragments	loderate 1101		
					•				
							-		1
-							-	1	1
-							-	1	-
-							-	1	-
-							-	1	-
-							-	1	-
-							-	-	-
60								$\vdash$	



PROJECT NUMBER:	BORING NUMBER:	
338884.FL	B-04A	SHEET 4 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724269.5 N, 457868.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

WATER	LEVELS	: 25.0 ft b	ogs on 6/	14/07	START : 6/12/2007 END : 6/13	/2007 LOGGI	ER:	Α.	Teal
200				STANDARD PENETRATION TEST RESULTS	SOIL DESCRIP	TION		ွှ	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA		TEST RESULTS	SOIL NAME, USCS GROUP S	SYMBOL, COLOR.		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
TH B		RECOVE		011 011 011	MOISTURE CONTENT, RELA CONSISTENCY, SOIL STRUCT	TIVE DENSITY OR	9		DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEP SUR ELE			#TYPE	6"-6"-6" (N)		ONE, MINENALOGY	á	S⊀⊮	
-18.0	60.0	0.1	SS-13	50/1 (50/1")	Limestone Fragments 60.0-60.1' - olive gray, (5Y 4/1),	moderate HCI	/	П	Driller's Remark: 60.0-65.0' drilling slows and becomes much harder
.				(50/1)	reaction, limestone fragments	moderate rior	<b>'</b>		and besomes made narder
.	-						4		_
-	-						+		-
-	-						+		-
-							1		Driller's Remark: very hard at 63.0'
-							1		_
							]		_
65_	65.0	0.1	SS-14	50/1	□ Limestone Fragments		#	Ц	switch to rock coring, see rock core log
-23.0	65.1	0.1	(00 14)	(50/1")	Limestone Fragments 65.0-65.1' - Same as 60.0-60.1'	/	/ [		- Switch to rock coming, see rock core log
-	-				Begin Rock Coring at 65.0 ft bgs See the next sheet for the rock of	sore log	+		-
-	-					C	+		-
-	-						1		-
-							1		_
							]		_
.							4		_
.	-						4		-
70 <u> </u>	-						$\dashv$		<del></del>
-	-						+		-
-							1		-
							1		
.	-						4		-
-	-						+		-
-	-						+		-
75	1						1		-
-33.0						•	7		
							]		
.							4		_
.	-						4		-
-	-						+		-
-	-						+		-
-							1		-
							1		
80							1		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-04A

SHEET 5 OF 9

**ROCK CORE LOG** 

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724269.5 N, 457868.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

				initial . Civil 300 O/N 1000/3, mad rotary, NQ tools, NVV			
WATER	LEVELS: 25	.0 ft b	gs on (	6/14/07 START : 6/12/2007 END : 6/	13/200	D7 LOGGER : A. Teal	
1.	_			DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		m	DESCRIPTION	SYMBOLIC LOG		
OFF	Z,A,Z	~	FRACTURES PER FOOT	DESCRIPTION	┛┇┃	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
A S E	SE	(%) O	ĮŽΫ	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	点	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
[ 문문]	S S S S S S S S S S S S S S S S S S S	Ω	AC R	PLANARITY, INFILLING MATERIAL AND	₩	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SSI	SHR	æ	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	l y	CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
-23.0	65.0				╁	Limestone	Installed HW casing to
			2			- 65.0-65.4' - pale yellowish brown,	65.0'
				65.7, 65.85, 66.2' - Fractures (3), <10 deg,	ш	(10YR 6/2), medium grained,	Driller's Remark: 65.5-67.0'
-				rough, undulating, open 3/16"	Н	moderate HCl reaction, very weak	very soft (silt lense)
-			3	66.25-66.7' - Fracture, vertical, rough,	╀づ	<ul> <li>(R1), voids (up to 1/8") over 30% of</li> </ul>	-
l _				undulating, changing to 30 deg over last 1"	Ш	surface, trace casts/cavities (up to	_
	R1-NQ			from 66.6-66.7', open 1/8"	Н	3/8"x1/4"), poorly fossiliferous	
-	5 ft	19		66.9' - Fracture zone	Н	- 65.4-66.9' - light olive gray, (5Y 5/2),	1
-	38%			-	$+ \Box$	fine to medium grained, moderate HCl reaction, very weak to weak (R1	Daille de De ace do 00 0 00 5
			NR			to R2), voids (up to 3/16") over 30%	Driller's Remark: 68.0-68.5' very soft (silt lense)
			INIX		Ш	of surface, trace linear casts	very soit (siit lense)
-				-	+	(1/16"x1/16"), poorly fossiliferous	R1: 10 minutes
_					广门	No Recovery 66.9-70.0'	-
70	70.0				Ш	•	
-28.0				_	H	Limestone	Driller's Remark:
-			>10	70.0-70.6' - Fracture zone	╂╵┤	- 70.0-70.6' - light olive gray, (5Y 5/2),	Approximately 3.0' of R2-
1 -				70.0 70.0 - 1 100tulo 20116	ш	strong HCl reaction, medium strong	NQ lodged in core barrel,
					$\square$	(R3), voids (1/16") over 5% of	driller removing string of
_				•	₩	- surface, trace spherical	NQ rod to retrieve sample - (14:38)
-	D2 NO				団	casts/cavities (3/8"), partial infill with material similar to 65.4-66.9', trace	Driller's Remark: unable to
l _	R2-NQ 5 ft	0		_	П	- thread-like black (organic) inclusions	retrieve sample from core -
	12%	U			Н	at 70.5'	barrel
-			NR	-	╁┼	No Recovery 70.6-75.0'	1
-						_	-
l _					Щ	_	
					Н		R2: 6 minutes
					11	-	1
75 <u> </u>	75.0			75 0 75 41 Fracture	ш		_
-33.0			>10	75.0-75.4' - Fracture zone	Н	Limestone - 75.0-79.2' - moderate yellowish	
			-10	· ·	Н	brown, (10YR 5/4), mild HCl reaction,	
-				75.8-76.0, 76.0-76.2' - Fractures (2), 60 deg,	Ш	very weak to weak (R1 to R2),	Driller's Remark: medium
_			>10	smooth, undulating, tight	+	- 77.95-78.05' is extremely weak to	to hard
				76.6-76.7' - Fracture, 45 deg, smooth,	Н	very weak (R0 to R1), voids (up to	
	R3-NQ			undulating, tight	Ш	1/8") over 20% of surface, trace	17:00 stop due to lightning
-	5 ft	51	>10	77.5' - Mechanical break		- cavities, large cavity	-
_	84%			77.7' - Fracture, horizontal, rough, undulating,	₽₩	(1-9/16"x1-3/16") partially infilled with	
				open	Н	soft (R0) carbonate at 77.2'	17:30 shut down for day
1 -			2	77.85-78.05' - Fracture zone		=	6/14/07 water level at 25.0'
-			0	78.05-78.8' - Fracture, vertical, smooth,	ш	-	R3: 6 minutes
1 -			$\overline{}$	undulating, open 1/8"	╂┼┦	No Recovery 79.2-80.0'	No. 0 minutes
80	80.0		NR	78.8' - Fracture, <5 deg, rough, undulating,	Ш		
-38.0				open 3/8" — 80.1' - Fracture, no discerning orientation	Ш	Limestone	Driller's Remark: "stiff" run
1 -			1	30.1 - Fracture, no discerning offentation	╂┯╂	- 80.0-84.7' - Same as 75.0-79.2'	except soft at last 2.0'
1 -					╁┼┤	_ except moderate HCl reaction,	]
				81.25' - Fracture, 30 deg, rough, undulating,	Ш	extremely weak to weak (R0 to R1)	
1 -			2	open	$\square$	<ul> <li>at 82.9-83.5', trace casts/cavities (up to 3/4"x9/16")</li> </ul>	1
-	DANO			81.5' - Mechanical break	╀┤	_ 10 3/4 X9/ 10 )	-
1 -	R4-NQ 5 ft	67	1	81.5-82.4' - Fracture or mechanical break,	Ш	_	]
	94%	O1	'	vertical and terminating at 60 deg, rough,	$\Box$		
1 -				undulating, tight	╁┼┼	-	1
1 -			>10	82.5' - Mechanical break	╀┼	_	-
1 _				82.9-83.1' - Fracture zone	口	_	]
1			0	83.35-83.5' - Fracture zone 83.8-84.0' - Fracture zone	Ш		R4: 5 minutes
				00.0-04.0 - FIACIUIE ZUIIE	╂┼┤	_	1 -
85	85.0		NR		H	No Recovery 84.7-85.0	
1					1 1		
1			1		1		I

ORIENTATION : Vertical



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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724269.5 N, 457868.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

WATER	LEVELS : 25	.0 ft b	gs on 6	S/14/07 START : 6/12/2007 END : 6/	13/20	D7 LOGGER : A. Teal	
≥∩≘	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
ELO N (fl	AND AND 3≺ (%	_	ZES T	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING.
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	S Q	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-43.0					ш	Limestone	
_			>10	85.0-85.5' - Fracture zone	ш	<ul> <li>85.0-86.35' - Same as 75.0-79.2'</li> <li>except cavities (1-3/16"x3/8") at 86.3'</li> </ul>	-
			1	85.7' - Fracture, horizontal, rough, undulating, open	」	over 50% of surface 86.35-87.65' - yellowish gray, (5Y	SC-1 collected at 86.35-
_			'	86.2-86.3' - Fracture, 30 deg, rough, undulating, open	Ш	_ 7/2), fine grained, moderate HCl	87.4'
-	R5-NQ 5 ft	41	2	87.35-87.55' - Fracture, 60 deg, smooth,		reaction, medium strong (R3), trace voids (up to 1/16"), trace cavities	Driller's Remark: 87.0-87.5' soft -
_	78%			stepped, tight		(5/16"x1/16")	-
-			3	88.25-88.35' - Fracture, 30 deg, rough,	Ш		_
-				undulating, open 88.35-88.9' - Fracture, vertical, smooth,	Ш	Limestone 87.8-88.9' - yellowish gray, (5Y 7/2),	R5: 6 minutes
90	00.0		NR	undulating, tight 88.7' - Fracture, horizontal, rough, undulating,	Ш	fine grained, moderate HCl reaction,	-
-48.0	90.0			tight -	$\vdash$	wery weak to weak (R1 to R2), trace voids (up to 1/16"), <2% casts (up to	Driller's Remark: 89.0-90.0'
-			>10	90.0-90.2' - Fracture zone 90.5-90.95' - Fracture zone	$\vdash$	1/4"x1/4") No Recovery 88.9-90.0'	soft -
-					Ħ	90.0-91.9' - yellowish gray, (5Y 7/2),	SC-2 collected at 90.9-
			1	91.8' - Fracture, horizontal, rough, undulating,	H	fine to medium grained, very strong HCl reaction, very weak (R1), voids	
_	R6-NQ 5 ft	25		open	Ħ	(up to 3/16") over 15-20% of surface, trace spherical casts and cavities (up	_
_	38%				H	_ to 3/8")	_
_			NR			No Recovery 91.9-95.0'	-
-					H	_	R6: 3 minutes
95	95.0				世	-	-
-53.0	95.0			_	Ħ	 Limestone	_
_			3	95.4' - Bedding plane, horizontal, smooth, planar, tight	Ħ	<ul> <li>95.0-100.0' - very pale orange to yellowish brown, (10YR 8/2 to 10YR</li> </ul>	-
			4	95.65-95.8' - Fracture, 30 deg, smooth,		6/2), fine to medium grained, strong  HCl reaction, very weak to weak (R1	
_			4	undulating, open 96.05' - Fractures (2), <30 deg, smooth,	Ш	to R2), voids (up to 3/16") over	
_	R7-NQ 5 ft	61	>10	undulating, open 96.4' - Fracture, 25 deg, smooth, stepped,	Н	15-20% of surface, no visible cavities except 98.0-98.6' 10% casts/cavities	_
_	100%			tight	Ш	(up to 1"x3/8"), poorly fossiliferous, black (organic) laminae at 97.9'	_
-			1	96.6-96.7' - Fractures (2), horizontal, smooth, undulating, open	Ш		-
-				97.0-97.7 - Fracture zone (8), 0-30 deg, rough, undulating, open	Ш	-	R7: 5 minutes
100	100.0		1	98.35, 98.45' - Fractures (2), <10 deg, rough, undulating, tight		-	-
-58.0	100.0			99.55' - Bedding plane, horizontal, rough,	H	 100.0-100.55' - Same as 95.0-100.0'	
1 -			>10	undulating, tight 100.2, 100.4' - Fractures (2), horizontal,	鬥	100.55-103.4' - very pale orange,	
1 -			2	smooth, undulating, open 100.55, 100.9'	Ш	(10YR 8/2), fine to medium grained, strong HCl reaction, very weak to	]
] -				101.4, 101.85, 102.35, 102.55, 102.7, 102.9' -	Щ	weak (R1 to R2), trace voids (up to 1/16"), no visible casts/cavities	]
-	R8-NQ 5 ft	26	5	Fractures (6), horizontal, smooth, undulating, open	Щ	- 1, 10 ), 110 visible casts/cavities	_
-	68%	-		102.95-103.15' - Fracture zone, black	Щ	-	-
-			2	staining over 75% of surface	田	No Recovery 103.4-105.0'	-
-			NR		世	-	R8: 4 minutes
105	105.0		1411		Ш	-	-
105	100.0						
1							



PROJECT NUMBER:

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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724269.5 N, 457868.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

WATER	LEVELS : 25	.0 ft b	gs on (	6/14/07 START : 6/12/2007 END : 6/	13/20	07 LOGGER : A. Teal	
≥∩≘	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
NANI (#)	Ä, AND 3Y (3	_	ES T	DESCRIPTION	O LC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-63.0			>10	105.2-106.15' - Fracture zone or bedding plane, horizontal, smooth, undulating, open		Limestone  - 105.0-107.5' - very pale orange, (10YR 8/2), fine to medium grained,	-
_			>10	106.15-106.4' - Fracture zone 106.5, 106.7, 106.95, 107.0, 107.05, 107.3,	Ħ	strong HCl reaction, very weak to weak (R1 to R2), trace voids (up to 1/16"), no visible casts/cavities	- -
-	R9-NQ 5 ft 50%	0	5	107.4' - Bedding plane (7), horizontal, smooth, planar to undulating, open	Ħ	No Recovery 107.5-110.0'	- -
-			NR	· · · · · · · · · · · · · · · · · · ·		- -	R9: 3 minutes
110	110.0						
-68.0 -			NA			Carbonate Silts And Sands (SP-SM) 110.0-111.4' - yellowish gray to light	Unclear if material is cuttings or very poorly indurated rock that was
-			NA	111.65, 111.95' - Fractures (2), <10 deg,		olive gray, (5Y 7/2 to 5Y 5/2), very strong HCl reaction, grades from 60% silt-sized particles to 40%	destroyed by drilling action
-	R10-NQ 5 ft 74%	12	>10	rough, undulating, open (small rock fragments associated with fracture) 112.5' - Mechanical break 112.8-113.3' - Fracture zone, possibly due to casts/cavities		sand-sized particles to 80% medium sand-sized particles and 20% silt-sized	_
-			>10			Limestone 111.4-113.7' - very pale orange, (10YR 8/2), fine to medium grained,	-
115_	115.0		NR	-	Ħ	extremely weak to weak (R0 to R2), 111.4-112.0' no visible voids or cavities, at 112.0-113.7' voids (up to	R10: 3 minutes
-73.0 -			>10	115.0-115.2' - Fracture zone 115.2-115.4' - Bedding plane (3), horizontal, smooth, planar, open		3/16") over 15-20% of surface, 10% - casts/cavities (up to 9/16"x3/4") No Recovery 113.7-115.0'	-
_			1	115.55, 115.75, 115.95' - Fractures (3), horizontal, rough, undulating, open 116.55' - Fracture, <10 deg, rough,		Limestone - 115.0-116.8' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2),	Driller's Remark: 116.5- 120.0' very soft -
-	R11-NQ 5 ft 36%	11	NR	undulating, open		medium to coarse grained, strong  HCl reaction, very weak (R1), voids over 30-60% of surface (as spaces between fossil fragments; almost  "coquina" appearance), trace cavities	- - - -
120	120.0					(up to 3/8"x5-7/8"), highly fossiliferous  No Recovery 116.8-120.0'	R11: 3 minutes
-78.0 -	120.0			_	Ħ	No Recovery 120.0-125.0'	Driller's Remark: no recovery 6/14/07
-						-	- -
-	R12-NQ 5 ft	0	NR			-	- -
-	0%				Ħ	-	- -
-						-	R12: 2 minutes
125	125.0				╫		



PROJECT NUMBER:

33884.FL

B-04A

SHEET 8 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724269.5 N, 457868.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

				1211 : CIVIL 330 3/11 100073, Hidd Totally, 110 10013, 1111			ONLIVIATION: Vertical
WATER	LEVELS: 25.	0 ft b	gs on (	6/14/07 START : 6/12/2007 END : 6	/13/20	D7 LOGGER : A. Teal	<u>,                                    </u>
>				DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표원은	Z A A	(%	FRACTURES PER FOOT		임	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
±ĕ.¥	GT G	(%) Q	CTI	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BO	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
92,5		a a	'RA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	. XN	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-83.0	014	ш	шш		0)		
-03.0			>10	125.0-125.9' - Fracture zone	$\perp$	<b>Limestone</b> - 125.0-125.35' - Same as	]
			- 10			115.0-116.8'	
_					1	125.35-125.6' - yellowish gray, (5Y	1
-					$\pm$	<ul> <li>7/2), fine grained, strong HCl</li> </ul>	1
_					$\perp$	reaction, very weak (R1), trace voids (up to 1/16"), no visible cavities	-
l _	R13-NQ 5 ft	0				- 125.6-125.9' - Same as 115.0-116.8'	_
	18%	U				No Recovery 125.9-130.0'	
_			NR		1	f	1 1
-					+	-	Driller's Remark: very soft
_					$\perp$	-	to 128.5'
_					$\perp$	_	R13: 4 minutes
130	130.0						
-88.0	.00.0			-	1111	Carbonate Silts And Sands (SM)	possible alluvial/fluvial
-			NA		+	- 130.0-131.6' - yellowish gray to light	deposit -
-					4111	olive gray, (5Y 7/2 to 5Y 5/2), loose, strong HCl reaction, fine to medium	-
l _			NA			grained sands	
			INA			Limestone	1
_	R14-NQ			131.85-132.25' - Mechanical break	1	131.6-132.8' - yellowish gray, (5Y	1 1
-	5 ft	0	>10	132.0-132.9' - Fracture, vertical, rough, undulating, open	+	7/2), strong HCl reaction, extremely	
_	56%			132.25-132.5' - Fracture zone	$\perp$	weak to weak (R0 to R2), voids (up	-
_				133.2, 133.3, 133.4' - Fractures (3), <10 deg,	$\perp$	to 1/16") over 5-10% of surface and increasing with depth, no visible	_
			ND	rough, undulating, healed		casts except 133.55-133.8' 20-30%	
-			NR		$\perp$	casts (up to 1-3/4"x1")	R14: 5 minutes
					+	No Recovery 132.8-135.0'	1
135 <u>-</u> -93.0	135.0			-	717	Components Silts And Sounds (SM)	Descible suttings on infill
-93.0			NA			Carbonate Silts And Sands (SM) - 135.0-136.35' - Same as	Possible cuttings or infill
			INA			130.0-131.6'	
_					1111	_	] 1
-			>10	136.35-136.7' - Fracture zone	$+\Box$	- Limestone	1 -
-	D45 NO			136.95' - Fracture or mechanical break,	+	136.35-137.6' - yellowish gray, (5Y	1 -
_	R15-NQ 5 ft	10	1	horizontal, smooth, planar		7/2), fine grained, strong HCl reaction, medium strong (R3), no	
	52%	10		137.05' - Fracture, horizontal, rough,		visible voids or cavities except 10%	
_				undulating	1	voids at 137.4' and 137.6'	1
-					+	- No Recovery 137.6-140.0'	-
-			NR		++	-	P15: 26 minutes
l _					$\perp$	_	R15: 26 minutes
140	140.0						
-98.0				_		Carbonate Silts And Sands (SM)	Possible cuttings or infill
-			NA		1	- 140.0-141.5' - Same as 130.0-131.6'	1
_					4	except grades from 60% fines to fine sand at top to 80% medium sand and	1 -
_			NA		111	20% fines at bottom	
			>10	141.5-141.9' - Fracture zone	$\perp$	Limestone	
-	R16-NQ			141.9-142.6' - Fracture, vertical, rough,	$\Box$	141.5-142.9' - yellowish gray, (5Y	1
-	5 ft	0	>10	undulating, open 142.35' - Fracture, horizontal, rough,	1	7/2), fine to medium grained, strong	1
-	58%			undulating, open	++	HCl reaction, very weak (R1), trace	-
l _				142.45' - Fracture, horizontal, rough,	$\perp$	voids (up to 1/16"), no visible cavities  No Recovery 142.9-145.0'	]
			ND	undulating, open		110 11000 toly 1-2.0-1-0.0	
-			NR	142.6-142.9' - Fracture zone			R16: 4 minutes
	445.0				$+\square$	-	1
145	145.0				+		



PROJECT NUMBER:

33884.FL

B-04A

SHEET 9 OF 9

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724269.5 N, 457868.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

WATER	LEVELS: 25	.0 ft b	gs on 6	6/14/07 START : 6/12/2007 END : 6/1	3/20	07 LOGGER : A. Teal	
≥∩≘	(9)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-103.0	R17-NQ 5.2 ft 100%		3 3 3	145.95' - Mechanical break 146.5, 146.75, 147.2, 147.85, 147.95' - Fractures (5), horizontal, rough, undulating, open 147.6-147.8' - Mechanical break, extremely weak section 147.85-148.15' - Fracture, vertical, rough, undulating, open 148.15, 148.5' - Fractures (2), horizontal, rough, undulating, open 149.05' - Bedding plane, smooth, planar to undulating, open 149.8' - Bedding plane, smooth, planar to undulating, open 149.8' - Bedding plane, smooth, planar to undulating, open		145.0-146.5' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), trace voids (up to 1/16"), trace casts and cavities (up to 1/8"x3/16") 146.5-147.2' - Same as 145.0-146.5' except voids (1/16") over 10-15% of surface 147.2-150.15' - pale yellowish brown to very pale orange, (10YR 6/2 to 10YR 8/2), fine grained, strong HCI reaction, very weak (R1), thin alternating bands of pale yellowish brown to very pale orange (10YR 6/2 to 10YR 8/2) from 147.7-148.45', extremely weak (R0) rock from 147.6-147.8', voids (up to 1/16") over 5-15% of surface and decreasing with depth, trace casts/cavities (up to 3/8"x3/16") Bottom of Boring at 150.2 ft bgs on 6/13/2007	R17: 4 minutes  Total depth of boring 150.15' below ground surface at 14:10 First batch grout: 32 gallons water, 6 47-lb bags of Portland cement up to approximately 100.0' below ground surface Second batch grout: 32 gallons water, 6 47-lb bags of Portland cement up to approximately 40.0' below ground surface - pull casing up to 25.0' below ground surface Third batch of grout: 32 gallons water, 5 47-lb bags of Portland cement up to ground surface Total grout: 96 gallons of water, 17 47-lb bags of Portland cement



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-05	SHEET	1	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724427.7 N, 457904.5 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 4.0 ft bo	gs on 5/8/	07 8	START : 5/7/2007 END : 5/9/2007 LOGGER	: N.	Jarzyniecki
				STANDARD	SOIL DESCRIPTION	Ó	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	. ,	PENETRATION TEST RESULTS	SOIL NAME LISCS CHOLID SAMBOL COLOD	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	ERY (ft)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DRILLING FLUID LOSS, TESTS, AND	
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYM	INSTRUMENTATION
42.9	0.0				Poorly Graded Sand (SP)		
		1.5	SS-1	1-2-1 (3)	0.0-1.0' - light gray, (N7), dry to moist, very loose, very fine silica sand, trace nonplastic fines, trace very		
_	1.5			(-,	fine grained black particles, roots  Silty Sand With Organics (SM)		_
-					\ 1.0-1.5' - dusky vellowish brown grading to dark		-
-					yellowish brown, (10YR 2/2 to 10YR 4/2), moist, very loose, very fine to fine grained, silica sand, 15-20%		-
-					nonplastic organic fines		-
-					-		-
-					-		-
5	5.0				-		-
37.9				5.0.4	Poorly Graded Sand With Silt (SP-SM) 5.0-6.1' - white with dark yellowish orange and pale -		
_		1.1	SS-2	5-6-4 (10)	yellowish brown staining, (N9, with 10YR 6/6 and		_
-	6.5				10YR 6/2), wet, loose, very fine to fine grained, silica sand, 5% nonplastic fines, trace angular black coarse		-
-					sand-sized material (pyrite), trace roots		-
-					<del>-</del>		-
-					-		-
-					<del>-</del>		-
-					_		_
10	10.0					·1 1·1	
32.9				3-3-3	Silty Sand (SM) 10.0-11.3' - pale yellowish brown, (10YR 6/2), wet,		-
-		1.3	SS-3	(6)	loose, very fine to fine grained, sílica sand, 30% nonplastic fines, trace very fine sand-sized black		-
-	11.5				particles	11.11.	-
-					-		-
-					-		-
-					_		_
1 -							
-					_		-
15 <u> </u>	15.0				Silty Sand (SM)	717	
-"		1.1	SS-4	3-2-2	15.0-16.1' - Same as 10.0-11.3' except very loose		-
-	16.5	'.'	00-4	(4)	<u> </u>		-
1 -	10.5				-		-
1 -					]		_
1 -							
-					_		-
-					<del>-</del>		-
					-		-
20							



PROJECT NUMBER:	BORING NUMBER:

338884.FL B-05 SHEET 2 OF 10

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724427.7 N, 457904.5 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 4.0 ft b	gs on 5/8/	07 5	START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki
>00				STANDARD	SOIL DESCRIPTION COMMENTS
N AN C	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
22.9	20.0			. ,	Sandy Fat Clay (CH)
-	1	1.4	SS-5	2-3-4 (7)	20.0-21.4' - light greenish gray, (5GY 8/1), wet, stiff, high plasticity, no dilatancy, no HCl reaction, heavily
	21.5			(. /	mottled with dark yellowish orange (10YR 6/6), 30%
I .					\ black particles, scattered pockets of medium \
-					\sand-sized white particles throughout, up to 1/8" in \
_					
-					-
-					-
-	05.0				-
25 <u> </u>	25.0				Silty Sand (SM)
-	1	0.7	SS-6	5-6-5	25.0-25.7' - yellowish gray, (5Y 7/2), wet, loose, very
-	26.5			(11)	fines, trace very fine sand-sized black particles
-					<b>1</b>
					]
_					<u> </u>
_					_
-					_
-					-
30 <u> </u>	30.0				Silty Gravel With Sand (GM)
-		1.0	SS-7	1-3-3	30.0-30.95' - yellowish gray, (5Y 8/1), wet, stiff, low to   ┩↓│ ▮
-	31.5			(6)	medium plasticity, rapid dilatancy, no HCl reaction,
-	31.3				\sample is fine to coarse gravel-sized material, trace organics, limestone appearance, also has appearance
-	1				of fine grained conglomerate
					]
_					<u> </u>
-					_
-					
35 7.9	35.0				Sand With Silt (SP-SM)
-	-	1.2	SS-8	4-6-5	35.0-36.15' - yellowish gray, (5Y 7/2), wet, medium -   ∰
-	26.5	1.2	00-0	(11)	dense, very fine to fine grained, no HCl reaction, silica sand, with trace medium dark gray (N4) mottling, 10%
-	36.5				\nonplastic fines \frac{1}{2}
-	1				1
-	1				1
					]
-					] ]
-	-				] ]
40					<del>                                     </del>



PROJECT NUMBER: BORING NUMBER: B-05

## **SOIL BORING LOG**

SHEET 3 OF 10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724427.7 N, 457904.5 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

						END : 5/0/2007			ORIENTATION : Vertical			
WATER	LEVELS	. 4.U π b	gs on 5/8/		START : 5/7/2007	END : 5/9/2007 SOIL DESCRIPTION	LUGGE	K:N	Jarzyniecki COMMENTS			
≥⊕£		- 151	1 (6)	STANDARD PENETRATION		SOIL DESCRIPTION		8	COIVIIVIEN 15			
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE INTERVAL (ft)			TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBOL	COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,			
H BI		RECOVE	'ERY (ft)		MOISTURI	E CONTENT, RELATIVE DE	NSITY OR	点	DRILLING FLUID LOSS, TESTS, AND			
무유			#TYPE	6"-6"-6"	CONSISTEN	NCY, SOIL STRUCTURE, MI	NERALOGY	Σ	INSTRUMENTATION			
<u> 2.9</u>	40.0	-		(N)	Flastic Silt Δr	nd Fat Clay (CH)		Ü	Driller's Remark: Loss of circulation after			
	40.0	, -	00.0	1-2-2	40.0-41.5' - gra	ayish olive green, (5GY 3/2		<b>-///</b>	pulling up SPT sampler –			
-		1.5	SS-9	(4)		, no dilatancy, materials are ay giving a mottled appear		<b>-///</b>	-			
_	41.5					clay, mottled with another						
_						ray (5Y 3/2), high plastic, n		1	_			
_						on, silt is yellowish gray (5Y ic, rapid dilatancy, very mile		1	_			
_					reaction			_	_			
_								J				
								1	]			
45	45.0							1	]			
-2.1						d Sand With Silt (SP-SM)			1			
-		1.3	SS-10	3-5-5 (10)		ale yellowish brown with mo (10YR 6/2 with N4 staining		1部	1			
-	46.5			(10)	very fine to fin	è grained, no HCl reaction	, silica sand,		_			
-	70.0					lastic fines, 1/2" lens of gra		1	1			
-					\sand-sized pyi		ine to coarse	1	-			
-								1	-			
-								┨	-			
-								1	-			
-								┨	-			
-								-	-			
50 -7.1	50.0				Sandy Lean C	Clay (CL)		1///	_			
-/.1		l		1-2-3	50.0-51.5' - gr	eenish gray and grayish ol		<b>-</b>	-			
_		1.5	SS-11	(5)		5GY 3/2), wet, stiff, high pl HCl reaction, 40% very fine			_			
_	51.5					and pockets of other mater			4			
_						ss than 10% of sample, yel		1	_			
_						y seam, pocket of medium s, pockets of silty material	sanu-sizeu	1	_			
l _						· · · · · · · · · · · · · · · · · · ·						
I _								]				
								]				
I -									]			
55	55.0							]	]			
-12.1						d Sand With Clay (SP-SC		11	7			
_		1.5	SS-12	1-1-2	55.0-56.5' - gro (5GY 6/1 and	eenish gray and grayish ol 5GY 3/2), wet, stiff, no to r	ıve green, nild HCl	1/	1			
-	56.5			(3)	reaction, no w	hite particles, lenses of gra	ayish green	1/2	]			
-	00.0					ay (CH) similar to 40.0-41. nic lens, lenses of other ma		†·	1 1			
-						e, sample has mottled app		1				
-								1	-			
-								1	-			
-								1	-			
-								-				
								-	-			
60							<del>-</del>	+	-			
	l	1	l .	l .	1							



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-05	SHEET	4	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724427.7 N, 457904.5 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 4.0 ft bo	gs on 5/8/	07 S	START : 5/7/2007 END : 5/9/2007 LOGG	ER:	N.	Jarzyniecki
300				STANDARD	SOIL DESCRIPTION		G	COMMENTS
AND AND	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		ССО	DEDTIL OF CACING DUILING DATE
H BE ACE ATIO		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		30LI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
-17.1	60.0			(,	Silty Sand (SM)		Ī	
-		1.5	SS-13	0-1-2 (3)	60.0-61.5' - yellowish gray, (5Y 7/2), wet, very loose, no HCl reaction, silica sands, 30% nonplastic fines,	- []		<del>-</del>
-	61.5			(3)	trace very fine sand-sized black particles	1		_
-						T		_
						]		
_						4		_
_						4		_
-						4		-
						-		-
65 <u> </u>	65.0				Clayey Sand (SC)	-	///	_
-		1.5	SS-14	2-1-3	65.0-66.5' - yellowish gray, (5Y 7/2), wet, very loose, no HCl reaction, with trace gray staining, very fine to	-		-
-	66.5		00 11	(4)	fine silica sands, 35% medium plastic fines	1		-
-	00.0					Ť	<i>!!!</i>	
						1		
						]		
_						1		_
_						4		_
-						4		_
70 <u> </u>	<del>7</del> 9:9	0.0	\SS-15 <i>)</i>	50/1	─ No Recovery 70.0-70.1'	#		
		0.0_/	(00 10)	(50/1")	No resorting resortion	′ ┨		last SPT on 5/7/07
-						$\dashv$		-
-						1		Driller's Remark: 70-71.5' hard material,
-						1		maybe rock layer, soft easy Driller's Remark: - Drilling with intermittent light chatter, switch
-						1		to newer tricone roller Driller's Remark: Drill
						1		bit 2-7/8" in diameter –
						]		
_						1		
75	75.0 75.3	0.2	00.46	E0/2 2E	Limentone Everymente	4		E/9/07 07:45 Water level 4 01 halaw grows
-32.1	13.3	U.3	SS-16	50/3.25 (50/3.25") /	Limestone Fragments 75.0-75.3' - yellowish gray, light olive gray, and	炐		5/8/07, 07:45 Water level 4.0' below ground surface, 4" HW casing installed to 70' below -
_					moderate gray, (5Y 7/2, 5Y 8/8, and N5), mild HCl reaction, angular and subangular 1/4" to 3/4" sized	/-		ground surface Driller's Remark: rock fragments are caving
-					fragments	/ -		into bottom of borehole, advanced 4" HW -
-						+		casing to 75' below ground surface
-						+		-
-						1		-
-						1		-
						1		_
80						_]		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-05	SHEET	5	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724427.7 N, 457904.5 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 4.0 ft bo	gs on 5/8/	07 8	START : 5/7/2007 END : 5/9/2007 LOGG	GER	: N.	Jarzyniecki
>				STANDARD	SOIL DESCRIPTION		g	COMMENTS
AND N (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS	COIL NAME LISCS CROLID SYMBOL COLOR		СГО	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
-37.1	80.0		SS-17	50/2	Limestone Fragments	Γ	_	Driller's Remark: Advanced 4" HW casing to
				(50/2")	80.0-80.1' - greenish gray, (5GY 6/1), moderate HCI reaction, 15% voids/casts on surface, very poor			78.6' below ground surface, switch to NQ – wireline coring assembly
l _					recovery Begin Rock Coring at 81.0 ft bgs	$V_{\perp}$		
-					See the next sheet for the rock core log	_		_
-						_		-
-						-		-
-						-		-
-	-					-		-
85	-					-		-
-42.1	1							_
								_
_								
_						_		_
-	-					-		-
-						-		-
-	_					-		-
-	-					-		-
90	-					-		-
-47.1								
								_
_	_					_		_
-						_		-
-						-		-
-	-					-		-
-	-					-		-
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95						-		-
-52.1								
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1								



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-05	SHEET	6	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724427.7 N, 457904.5 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.0	ft bgs	s on 5/	8/07 START : 5/7/2007 END : 5	9/200	7 LOGGER : N. Jarzyniecki	_
\$ □ \$	(%			DISCONTINUITIES	g g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B	E.R.L. STH, OVEI	(%) O	TO F	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30 I	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURF SURF SLEV	SOR	ROL	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	81.0	_			Ť	Limestone	First core run on 5/8/07
_			1		+	<ul> <li>81.0-85.3' - light olive gray, (5Y 5/2),</li> </ul>	
-				81.7' - Bedding plane, rough, undulating, organic material (brownish black ) covering	丰	moderate HCl reaction, weak to medium strong (R2 to R3),	-
-			2	80% surface, open 5/8"	世	<ul> <li>spheroidal voids up to 25% surface</li> </ul>	-
-	R1-NQ			82.3' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1"	╁┴	(<1/16") in size, moderately fossiliferous (casts, molds, up to	-
_	5 ft	90	1	82.6' - Fracture, 80 deg, rough, undulating,		<ul> <li>3/8"), trace irregularity shaped</li> </ul>	-
-	100%			tight 83.6' - Bedding plane, horizontal, rough,	-	cavities 25% infilled with very fine grain yellowish gray (5Y 7/2)	-
_			3	undulating, tight	╁╌	<ul> <li>material, trace to 7% organics,</li> </ul>	-
85 <u> </u>				84.3' - Fracture, 25 deg, rough, undulating, _ fossil casts/molds on fracture surface	丰	brownish black (5YR 2/1) lamination at 81.7', 83.6' and 84.2' and short (1"	R1: 9 minutes
- <del></del>			0	84.8' - Bedding plane, horizontal, rough,	岸	<ul> <li>long), discontinuous lamination</li> </ul>	TVI. 9 IIIIIIules
_	86.0			undulating, 1" thick, tight 84.9' - Fracture, vertical, rough, undulating,	世	85.3-86.0' - Same as 81.0-85.3' except yellowish gray, (5Y 8/1),	Drillorle Domark: 96 El 250/
_			2	grayish, staining 10% surface, tight	oxdapsilon	strong HCl reaction, medium strong	Driller's Remark: 86.5' <5% circulation loss, regained at
_				85.3' - Mechanical break 86.1' - Mechanical break	上	to strong (R3 to R4), 5-10% voids (<1/16"), very fine grain interval	87'
_			2	86.3' - Fracture, 80-90 deg, rough,	上	_ 86.0-87.1' - yellowish gray, (5Y 8/1),	
_				undulating, gray staining over 15-20%	$\vdash$	very fine to fine grained, strong HCl reaction, medium strong (R3), trace	_
_	R2-NQ 5 ft	30	0	surface, tight 86.85' - Bedding plane, horizontal, smooth,		voids (1/16"), organics rich carbonate	_
_	42%			planar, 1/4" carbonate silt infill, tight	世	silt bed (1/4" thick) 87.1-88.1' - Same as 86.0-87.1'	
			NR	87.1' - Bedding plane, horizontal, rough, undulating, open 1"	$oldsymbol{\perp}$	except very weak (R1), moderately	
90			INK	87.75' - Fracture, 10-15 deg, rough,	上	fossiliferous (casts, shells, molds), 10-15% fine to medium grained size	
-47. <del>1</del>				undulating, tight	上	_ medium dark gray (N4) particles in	R2: 8 minutes
	91.0				$\bot$	rock matrix, 20-25% elongated and	
			0		厈	<ul> <li>spherical shaped void/casts (&lt;1/16),</li> <li>yellowish gray discoloration on</li> </ul>	
			U		片	30-40% of material	
			0		Ľ	− No Recovery 88.1-91.0' Limestone	
			U		${\mathbb H}$	91.0-95.9' - yellowish gray, (5Y 8/1),	
	R3-NQ	00		93.1' - Fracture or mechanical break, 20 deg,	世	medium grained, strong HCl     reaction, very weak to weak (R1 to	
_	5 ft 98%	98	1	rough, undulating, tight 93.5' - Mechanical break	$\perp$	R2), highly fossiliferous (casts ,	
_				99.9 - IVICUIAI IICAI DIEAK	$\vdash$	<ul> <li>molds) fossils up to 1/2" in size, voids (&lt;1/16") up to 25% surface,</li> </ul>	
95			0		Ħ	trace micro (<1/16" thick) lamination	-
-52.1				=	世	— - brownish black in color - from 91.0-92.0' and 93.5-99.0' , trace	R3: 4 minutes
_	96.0		0		╁	spherical cavities up to 3/8" partially	-
-	55.0		NR)	96.21 Mechanical break harizantal rayah	扛	<ul> <li>filled with black very soft fine material (organics), medium gray (N5) fine</li> </ul>	-
-			0	96.2' - Mechanical break, horizontal, rough, undulating, open 1/2"	世	grain particles in rock matrix,	-
_					╁╴	<ul> <li>powder/chalk like texture to rock</li> <li>No Recovery 95.9-96.0'</li> </ul>	
-			2	07.65! Radding plans or machanical beauty	Ħ	Limestone ´	-
_	R4-NQ			97.65' - Bedding plane or mechanical break, horizontal, rough, undulating, tight	世	96.0-104.0' - Same as 91.0- 95.9' except large 1-1/4" cavity at 96.6',	-
-	5 ft	90	1	97.8' - Bedding plane or mechanical break,	╨	80% filled with carbonate silt, light	SC1-collected at 98.5-99.6'
-	100%			horizontal, rough, undulating, brownish black (organic) covering <50-60% surface, open	厂	Lolive gray (5Y 6/1) from 96.2-96.8' and 97.3-98.7', organics also	
_			1	1/16"	士	appears up to 1" long <1/32" thick	
100 <u> </u>				98.0' - Fracture or mechanical break, horizontal, rough, undulating, tight	╁┯	laminations at 96.3' and 97.3'	R4: 6 minutes
-	-		1	98.5' - Mechanical break	丰	-	- Timulo
_	101.0				片		

ORIENTATION: Vertical



PROJECT NUMBER:

33884.FL

BORING NUMBER:

B-05

SHEET 7 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724427.7 N, 457904.5 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 4.0	ft bgs	s on 5/	8/07 START: 5/7/2007 END: 5	/9/200	7 LOGGER : N. Jarzyniecki	
≥ ∩ ⊕	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
N (# O	N, AND ₹₹ (%		SES T	DESCRIPTION		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU	(%)	T. 05	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
1 20 2	0			99.6' - Fracture, 10-15 deg, rough,		Limestone	
-			0	undulating, tight 101.2' - Mechanical break, horizontal, rough,	$\pm$	<ul> <li>101.0-105.0' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak</li> </ul>	-
-				planar, <1/16 gap	+	to weak (R1 to R2), over all	-
-			2	102.2' - Fracture, 45 deg, rough, undulating, tight	$\Box$	<ul> <li>powder/chalk-like feel, 15-20% voids/casts, highly fossiliferous</li> </ul>	-
-	R5-NQ	00	. 40	102.6' - Mechanical break or bedding plane, rough, undulating, open up to 1/2"	$\perp$	(forams and foram casts), 10% fine  grain medium dark gray, (N4)	-
	5 ft 80%	36	>10	103.05, 103.15, 103.25, 103.3, 103.35,	井	particles (probably pyrite), yellowish	
			8	103.45, 103.5, 103.6, 103.7, 103.8, 104.0, 104.1, 104.2, 104.25, 104.35, 104.5, 104.6,	$\blacksquare$	gray (5Y 7/8) staining from - 101.0-103.0', voids tend to be	
105_			Ů	104.7' - Bedding plane or mechanical break	$\perp$	concentrated in a horizontal	
-62. <del>1</del>			NR	(18), smooth and planar to smooth and undulating, open 1/16"	$\perp$	orientation No Recovery 105.0-106.0'	R5: 8 minutes
-	106.0		,		円	_	-
-			>10	106.1' - Mechanical break, horizontal, rough, undulating, open 1/8"	鬥	Limestone - 106.0-107.0' - yellowish gray, (5Y	-
-				106.3-106.45' - Fracture zone, 1"-1-3/8" sized	$\perp$	8/1), very fine grained, strong HCl reaction, very weak to weak (R1 to	-
-			2	rock fragments 106.5' - Fracture, 80 deg, smooth, planar,	+	<ul> <li>R2), stained light gray (N7) over 40%</li> </ul>	-
-	R6-NQ			<1/22" organics on surface, tight 106.9' - Fracture, 50 deg, rough, undulating,	世	of entire sample, highly fossiliferous (forams and foram casts,	-
-	5 ft 90%	56	2	tight	世	<ul> <li>echinoderms), 20-25% fine grained pyrite in rock matrix, gradational with</li> </ul>	-
-	9070			107.4' - Fracture or mechanical break, horizontal, rough, undulating, tight	$\pm$	107.0-110.5'	-
110			2	107.8' - Fracture, 50-60 deg, rough, undulating, tight	╂┼	<ul> <li>107.0-110.5' - Same as 106.0-107.0' except fine grained, molds and casts</li> </ul>	-
-67.1			1	108.3' - Fracture or bedding plane, 15-20	Ħ	up to 1/32"-3/8"	R6: 5 minutes
	111.0		NR	deg, rough, undulating, open 1/8" 108.65-108.8' - Fracture zone	H	No Recovery 110.5-111.0'	
			>10	109.1' - Fracture, 10-15 deg, rough, undulating, tight	Ħ	Limestone - 111.0-115.4' - yellowish gray, (5Y	
_				109.4' - Fracture, 80-90 deg, rough,	Ħ	_ 7/2), medium to coarse grained,	_
_			1	undulating, open 1/2" 110.1' - Fracture, 60-65 deg, rough,	$\perp$	strong HCl reaction, weak (R2),  becoming mottled moderate yellow	CC 2 collected at 112 F
_	R7-NQ			undulating, tight 110.0-111.25' - Fracture zone	丰	(5Y 7/6) with depth, voids rare to absent except from 115.0-115.4'	SC-2 collected at 112.5- 113.6' -
-	5 ft	79	1	111.35' - Mechanical break, 50 deg, rough,	世	<ul><li>where voids &lt;1/16" cover 1-3% of</li></ul>	-
-	88%			undulating, tight 111.75' - Fracture, 50 deg, rough, undulating,	世	rock surface, cavities rare (3/16" in diameter), rare echinoderms, fossil	-
145			2	tight 112.5' - Fracture or mechanical break, 5-10	+	<ul> <li>voids/casts rare to absent, thick bedded except from 115.3-115.4'</li> </ul>	-
115_ -72.1			0	deg, rough, undulating, tight	╁	which is laminated, fine grained	R7: 4 minutes
1 -	116.0		NR	113.6' - Fracture, 50 deg, rough, undulating, tight	Н	<ul> <li>(sharp contact with overlying massive bedded limestone</li> </ul>	-
1 -	1.0.0			114.4' - Fracture, 0-5 deg, rough, undulating, tight	Ħ	No Recovery 115.4-116.0' Limestone	_
			3	114.8, 114.9' - Mechanical break or fractures	H	116.0-120.5' - yellowish gray, (5Y	
1 -			2	(2), horizontal, rough, planar 115.0' - Mechanical break, 30 deg, rough,	Щ	7/2), medium to coarse grained, very weak to weak (R1 to R2), except	]
-			_	undulating 116.1' - Bedding plane, 0-5 deg, rough,	Д	from 116.1-116.15' which is very fine grained and medium strong rock	_
] -	R8-NQ 5 ft	76	2	undulating, open 1/8", fine infilling	口	_ (R3), voids (<1/16") over 5% or less	-
-	90%			116.25-116.35' - Fracture zone 116.7' - Fracture or mechanical break,	$\Box$	of rock surface, some cavities up to 3/16" over 1-2% of rock surface to	-
-			2	horizontal, rough, planar, 1/8" open	$\pm$	_ 120.4', fossils (molds/casts) rare to absent, rare echinoderms, some	-
120_ -77.1			0	117.2' - Fracture, 20-25 deg, rough, undulating, open up to 1/8"	+	lithoclast (1"-1-1/2" long) from	R8: 7 minutes —
-	104.0		NR		$\blacksquare$	120.0-120.5', cavities common from 120.4-120.5'	-
	121.0		INIX		$\Box$		-
1							

ORIENTATION: Vertical



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	B-05	SHEET	8 OF 10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724427.7 N, 457904.5 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

	LEVELS : 4.0			/8/07 START : 5/7/2007 END : 5/9	9/ <u>2</u> 00	7 LOGGER : N. Jarzyniecki	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			3	117.5' - Fracture or mechanical break, horizontal, rough, undulating, tight to 1/2" -	i H	No Recovery 120.5-121.0'  Limestone	Water level 10.8' below ground surface in outer
-			1	open 118.65' - Fracture or mechanical break, horizontal, rough, undulating, tight 118.85' - Fracture, 20-25 deg, rough,		121.0-123.4' - yellowish gray, (5Y 8/1), medium to coarse grained, strong HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over	(4"HW) casing, 3.8' below ground surface in borehole (uncased) –
-	R9-NQ 5 ft 100%	77	4	undulating, tight  119.45' - Fracture, 35-40 deg, rough, undulating, tight		5-10% of rock surface, cavities common (up to 3/8"-3/4"), fossiliferous (echinoderms) and	-
125_			2	119.95' - Fracture, 20 deg, rough, undulating, tight 120.35' - Mechanical break		casts/molds, some areas where rock is fine-grained and stronger (R2-R3), some rip-up clasts/intraclasts	_
-82. <del>1</del> -	126.0		0	121.1, 121.3, 121.5, 121.6' - Bedding plane or mechanical break (4), horizontal, rough, undulating, open 1/8"  122.5' - Fracture, 40 deg, rough, undulating,		especially at 121.3-121.5' 123.4-126.0' - yellowish gray, (5Y 8/1), very fine to fine grained, alternating beds several inches thick,	R9: Runtime not recorded
-			>10	tight 123.4' - Fracture, 40 deg, rough, undulating, tight 123.4' - Fracture, 5-10 deg, rough, undulating, open <1/16"		voids (<1/16") over 1-3% of rock surface, some cavities up to 3/4" (especially at 124.7-124.9'), fossils	-
-	R10-NG		2	123.55, 123.75, 123.95' - Bedding plane or mechanical break (3), horizontal, rough, planar, tight		(molds/casts) rare to absent 126.0-127.8' - Same as 123.4-126.0' except rare fossil echinoids	-
-	5 ft 92%	52	1	124.3' - Bedding plane or mechanical break, horizontal, rough, undulating, tight 124.95' - Bedding plane or mechanical break, horizontal, smooth, planar, tight		_ 127.8-128.5' - yellowish gray, (5Y 8/1), medium grained, strong HCl reaction, very weak (R1), voids _ (<1/16") over 5% or less of rock	]
130_ -87.1			1	125.9' - Mechanical break, 50 deg, rough, undulating — 126.0-127.0' - Mechanical break, horizontal,		= (<3/16" in diameter), fossil = (ossil contest of the source of the sou	R10: Runtime not recorded
_	131.0		NR	smooth, planar, multiple breaks along bedding planes, tight 127.55' - Fracture or mechanical break, 0-5		128.5-130.6' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, voids (<1/16") over	First core run on 5/9/07,
_			>10	deg, rough, planar, tight 128.5' - Bedding plane, horizontal, rough, undulating, tight		3-5% of rock surface, some cavities up to 3/8"-3/4" in diameter (typically elongated), fossiliferous (molds/casts	water level at 4.1' below ground surface Driller's Remark: NQ core
_	R11-NQ 5 ft	23	>10	129.2' - Fracture or mechanical break, horizontal, open up to 1" - 129.7' - Bedding plane or mechanical break,		and rare echinoids), very rare - (<1/16") dark gray argillaceous grains	barrel has snapped in two pieces SC-3 collected at 131.85- 132.6'
-	50%	20	NR	horizontal, rough, planar, tight to 1/4" gap 130.15' - Fracture, 70-75 deg, rough, undulating, tight 131.15, 131.4' - Bedding plane or mechanical		No Recovery 130.6-131.0'  Limestone 131.0-132.6' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak	-
135 <u> </u>	136.0		IAIX	break (2), horizontal, smooth, planar, tight to — open 1/16" 131.85' - Bedding plane, horizontal, rough,		to weak (R1 to R2),     powder/chalk-like feel, highly     fossiliferous (forams), voids/casts	R11: 23 minutes -
_			3	undulating, tight, 3/4" sized exposed medium light gray (N6) filled voids on surface 132.6' - Fracture zone, angular fragments of rock		<ul> <li>(&lt;1/16") over 10-15% of surface,</li> <li>15-20% cavities infilled with medium</li> <li>light gray (N6) fine grained mineral</li> <li>with stong HCI reaction, cavities are</li> </ul>	]
_			3	136.1, 136.05' - Bedding plane or mechanical break (2), horizontal, rough, undulating, 1/8" open		irregularly shaped to spherical and range in size from 3/16" 1-3/8", horizontal aligned fossil (casts/shells)	]
-	R12-NG 5 ft 84%	66	0	136.3' - Fracture, 60 deg, rough, undulating, tight 137.1' - Fracture, 45 deg, rough, undulating,		and gray cavities, bedding/discontinuity at 131.65'	]
- 140 -97.1			1	centimeter spaced parallel fracture 137.3' - Bedding plane, horizontal, rough, undulating, light olive gray hard		_	P12: 15 minutes
-97.1	141.0		NR	mineralization over 38% surface, 1/32" thick, tight		_	R12: 15 minutes -



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-05

SHEET 9 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724427.7 N, 457904.5 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER LEVELS: 4.0 ft bgs on 5/8/07		s on 5/	/8/07 START : 5/7/2007 END : 5	5/9/	2007	LOGGER : N. Jarzyniecki		
≥∩ ∷	(9)			DISCONTINUITIES		ڻ و	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	1	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H H H	P.Y. KRY,	(%) O	JUR OO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	7	5	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
H.F.F.	NG CO	αD	AC.	PLANARITY, INFILLING MATERIAL AND		МВ	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
BS급	SHR	R(	H. H.	THICKNESS, SURFACE STAINING, AND TIGHTNESS	3	SΥ	CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
				137.35' - Mechanical break, 40-50 deg,	Ŧ	Щ	Limestone	
			3	rough, planar, tight 137.65' - Bedding plane or mechanical break,	1	$\Box$	132.6-133.5' - medium light gray to medium gray, (N6 to N5), very fine	1
1 7				horizontal, rough, undulating, exposed molds	1	-	grained, strong HCl reaction,	1
-			1	on surface, open 5/8"	t	╧	medium strong to strong (R3 to R4),	1
-	R13-NQ			138.5' - Mechanical break 139.25' - Fracture, 40 deg, rough, undulating,	+	-	trace voids/casts (<1/16"), poorly fossiliferous (1" molds), very fine	-
_	5 ft	50	3	tight	1	┰	grain pyrite grains in rock matrix	-
1 _	94%			140.1' - Mechanical break, horizontal, rough,	╁	$\perp$	(5-7%), 10-15% cavities from 1/8" to	_
			3	undulating, tight 141.25' - Mechanical break or bedding plane,	ļ		1" in size, oval in shape unfilled to partially filled with a yellowish gray	
145			3	horizontal, rough, planar, tight	7	Ш	(5Y 7/2) very fine grained material	
-102.1			2	141.65' - Fracture, vertical, rough, undulating,	T	П	that is 40-45% voids <1/16"	R13: 11 minutes
-	440.0			brown staining over surface (100%), <1/32" infill over 98% surface	+	廾	No Recovery 133.5-136.0' Limestone	1 1
-	146.0		NR)	141.75' - Fracture or mechanical break,	+	⇉	136.0-137.5' - yellowish gray and	1
-			3	horizontal, rough, undulating, tight	+	╨	light olive gray, (5Y 7/2 and 5Y 5/2),	1 -
-				142.5' - Fracture or mechanical break,	1	$\Box$	strong HCl reaction, medium strong to strong (R3 to R4), thin bedded	_
			4	horizontal, rough, undulating, tight 143.3, 143.5' - Fractures or mechanical break	╁	+L	alternating with very fine grained rock	
			7	(2), 5-10 deg, rough, undulating, tight	Į		with medium grain-sized particles in	SC-4 collected at 147.8-
	R14-NQ			143.85' - Fracture or mechanical break, 0-5	1	+	the laminated (<1/16") beds 137.5-140.2' - yellowish gray, (5Y	148.7'
-	5 ft 96%	60	1	deg, rough, undulating, tight 144.45' - Fracture or mechanical break,	t		7/2), fine to medium grained, strong	1
-	90 /6			horizontal, rough, undulating, tight	+	$\neg$ F	HCl reaction, very weak (R1), 7-10%	-
_			2	144.6' - Bedding plane or mechanical break,	ŧ		coarse grain-sized flat angular fossil	-
150 <u> </u>				horizontal, rough, undulating, 1/8" open 144.8' - Bedding plane or mechanical break,	ᅪ	-	fragments horizontally aligned,  15-25% medium to coarse	B44: 0
-107.1			2	horizontal, rough, undulating, 1/16" open	1	П	grain-sized medium dark gray (N4),	R14: 8 minutes
	151.0		NR	144.9, 144.95' - Mechanical break (2), rough, undulating, open <1/16"	上		subrounded particles also horizontally aligned, highly	
				145.1, 145.35' - Bedding plane (2), 0-5 deg,			fossiliferous, trace voids (<3/16"),	
				rough, undulating, wavy bed of organics,	П		sharp discontinuity at 139.5'	1
				100% surface coverage with brownish black organics	П		No Recovery 140.2-141.0' Limestone	1
-				146.5' - Bedding plane, 15-20 deg, rough,	H		141.0-142.6' - yellowish gray, (5Y	1
-				undulating	H	-	8/1), very fine to medium grained,	-
-				146.6' - Fracture, 50 deg, rough, undulating, tight	-		strong HCl reaction, very weak (R1), texture coarsening with depth to	-
_				146.8' - Fracture, 70 deg, rough, undulating,	4	L	sharp contact at 142.6', interval of	-
_				black stains over 100% surface , tight	4	L	moderate yellow brown and light	
				147.0' - Bedding plane or mechanical break, horizontal, rough, undulating, tight			brown (5Y 7/6 and 5Y 5/6) fine to medium grained rounded grains,	_
				147.3' - Bedding plane or mechanical break,	1		powder to chalk-like texture	
1 7				0-5 deg, rough, planar, tight	1		142.6-145.0' - Same as 141.0-142.6'	1
-				147.5' - Fracture, 60 deg, rough, undulating, black staining 80-90% surface, tight	1		except light olive gray, (5Y 5/2), moderate to strong HCl reaction,	1
-				147.8' - Fracture, 15-20 deg, rough,	┪	H	medium strong (R3), voids 10-15%	-
-				undulating, tight	4	H	(<1/16") spheroidal trace elongated	-
				148.7' - Fracture or mechanical break, horizontal, rough, undulating, tight	1		cavities 3/16"x1/16" 145.0-145.7' - Same as 141.0-142.6'	1
				149.25' - Fracture, 40 deg, rough, undulating,	]	L	except yellowish gray, (5Y 8/1), very	]
				tight to 1/8" open			weak to weak (R1 to R2), 25-30%	
]				149.45' - Fracture, 10-15 deg, rough, planar,	1		olive black (5Y 2/1) laminations No Recovery 145.7-146.0'	1
				tight 150.3' - Fracture or mechanical break,	1	l	Limestone	1
-				horizontal, rough, undulating, hard mineral	$\forall$	┟	146.0-146.5' - Same as 145.0-145.7'	1 1
-				infill covering 30-40% surface 1/16' thick,	$\dashv$	ŀ	-	-
-				open 1/8" 150.6' - Fracture or mechanical break,	4	-	.	1 4
				horizontal, smooth, planar, open 1/16"	1			



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-05	SHEET	10	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724427.7 N, 457904.5 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER LEVELS: 4.0 ft bgs on 5/8/07				8/07 START : 5/7/2007	END : 5/9	/200	7 LOGGER : N. Jarzyniecki	
>000	(9			DISCONTINUITIES		G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEDTH OF CASINO
ᆱᇬ은	RUF H. A	(%) Q	IUR 1	DEPTH, TYPE, ORIENTATION, ROUG	HNESS	)LIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
TAY A	NGT COO:	οD	ACT R F	PLANARITY, INFILLING MATERIAL	AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
BS급	잉크핆	8	띪	THICKNESS, SURFACE STAINING, AND	TIGHTNESS	SΥ	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
							Limestone	
-					-		- 146.5-150.8' - yellowish gray, (5Y 8/1), very fine to medium grained,	1
-					-		strong HCl reaction, very weak (R1),	-
-					-		<ul> <li>highly fossiliferous (molds, forams,</li> </ul>	-
-					_		fragments), sharp contact between medium grained limestone above	_
					_		<ul> <li>and fine grained limestone below at</li> </ul>	_
							150.0', from 149.0-150.0' casts/ fossil	_
							fragments give the rock interval gritty/friable texture, very fine grained	
							weak rock (R2) from 150.0-150.8'	
1 7							No Recovery 150.8-151.0'	
					=		- Bottom of Boring at 151.0 ft bgs on 5/9/2007	
					-		_ 0,0,2001	-
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-06	SHEET	1	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724172.6 N, 457791.6 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

						iry, auto nammer, Avvo rous, s			ORIENTATION : Vertical
WATER	LEVELS	: 4.4 ft bo	gs on 4/2	6/07 S	START : 4/24/2007	END : 4/26/2007	LOGGE	₹ : B.	
> ~				STANDARD		SOIL DESCRIPTION		ō	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				SYMBOLIC LOG	
필핑한		RECOVE	ERY (ft)	1		ME, USCS GROUP SYMBOL, ' E CONTENT, RELATIVE DEN		١ĕ	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
F A A			#TYPE	6"-6"-6"		ICY, SOIL STRUCTURE, MIN		MB(	INSTRUMENTATION
			#ITPE	(N)	00.10.0.2.1	10 1, 00 12 0 11 10 0 1 0 1 12, 11 11 1		SYI	
42.5	0.0			` '	¬ Topsoil			NL	16:51 Begin drilling, sample SS-1 taken; first
-	0.0		00.4	0-1-2	\0.0-0.2'		/	-	6"=weight of hammer -
-		1.0	SS-1	(3)	Poorly Graded	d Sand (SP)			
l _	1.5				0.2-1.0' - light l	brownish gray, (5YR 6/1), n	noist, very	┚	
					medium dark o	e to fine grained, silica sand gray (N4) mottling, trace of i	nonnlastic		
-					fines, roots and	d organics decreasing with	depth	1	1
-								1	1
-								-	-
_								1	_
_									
5	5.0							1	1
37.5	5.0				Clayey Sand (	(SC)		111	4/25/07, 07:38 Begin drilling to 5' using
-		<b> </b>	00.0	4-4-4	5.0-6.1' - greer	nish gray, (5G 6/1), moist to	wet, loose,	-	tricone bit
-		1.1	SS-2	(8)	very fine to fine	e grained, no HCl reaction,	silica sand,		07:40: SS-2 taken
_	6.5				black particles	icity fines, trace very fine sa	na-sizea		
					black particles				
_								1	1
-								1	
-								-	-
_									_
-								1	1
- 40	40.0							1	1
10 32.5	10.0				Silty Sand (SN	M)		111	07:48: SS-3 taken
- 02.0				3-3-4	10.0-11.25' - lic	ght olive gray to greenish g	ray, (5Y 6/1	4111	
_		1.3	SS-3	(7)	to 5GY 6/1), w	et, loose, very fine to fine q	rained, no	1111	_
	11.5			. ,		silica sand, 15% low plastici		Ш	
_					\trace very fine	black particles, trace organ	iics /		1
-								1	1
-								-	-
-								1	]
_								1	]
I -								1	]
-								1	1
,	4==							1	-
15 27.5	15.0				Silty Sand (SN	M)		1	SS 4 is less plactic than SS 2
				4-4-4	15.0-16 5' - lial	พ <i>)</i> ht olive gray to light gray, (5	SY 6/1 to	1111	SS-4 is less plastic than SS-3
		1.5	SS-4	(8)	N7), wet, loose	e, very fine to fine grained, r	no HCI		
1 -	16.5			(5)		sand, 30% low plasticity fir	nes, trace		1
-					very fine sand-	-sized black particles		1	1
-								1	-
-								-	
_								1	
I -								1	1
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20		-						╄	
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PROJECT NUMBER:

33884.FL B-06 SHEET 2 OF 9

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724172.6 N, 457791.6 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

					-	auto nammer, Avvo rous, o			ORIENTATION : Vertical
WATER	LEVELS	: 4.4 ft bo	gs on 4/26		START : 4/24/2007	END : 4/26/2007	LOGGER	: B. I	
≥Q⊋	041451	INITEDIT	1 (4)	STANDARD PENETRATION		SOIL DESCRIPTION		8	COMMENTS
DN (	SAMPLE	INTERVA		TEST RESULTS	SOIL NAME	USCS GROUP SYMBOL, (	COLOR	O L	DEPTH OF CASING, DRILLING RATE,
H B ATICE		RECOVE	ERY (ft)		MOISTURE C	CONTENT, RELATIVE DEN	SITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY	Y, SOIL STRUCTURE, MINI	ERALOGY	SYMBOLIC LOG	INSTRUMENTATION
22.5	20.0			(11)	Clayey Sand (SC	C)		///	
-		1.2	SS-5	2-5-4	20.0-21.0' - yellov	wish gray to light gray, (5)	Y 8/1 to N7),		-
-	<u>-</u>	1.2	00-5	(9)	rnoist, loose, nigr	h plasticity, no dilatancy, r les	10 HCI		-
-	21.5				Fat Clay (CH)		/ -		-
-	-				\21.0-21.2' - light	bluish gray, (5G 7/1), mo tancy, no HCl reaction	ist, stiff, high / _		-
-	-				plasticity, no dia	taricy, no riorreaction			-
-	-						-		-
-	-						-		-
-	1						4		-
-							_		-
25 <u> </u>	25.0				0101/00	<b>5</b>		~	
17.5				1-2-2	Clayey Sand (SC 25.0-26.4' - vello	<b>رَ)</b> wish gray, (5Y 8/1), wet, ۱	verv loose.		_
-		1.4	SS-6	(4)	very fine to fine of	grained, no HCI reaction,	25%		_
-	26.5				medium plasticity	y fines, increasing to 40%	by 26.2',		_
_					(=				<u>_</u>
l _							_		_
l _	]								_
l _									_
l _									_
30	30.0						1		
12.5					Silty Sand (SM)	i-h (40)/D 7/4)	-4		
-	1	1.5	SS-7	2-2-2 (4)		ish orange, (10YR 7/4), w o fine grained, no HCl rea			_
-	31.5			(4)	\no to low plasticit	ty fines, silica sand	/ 1		_
					Organic Soil (OF	<b>H)</b> · black, (5Y 2/1), wet, soft,	high /	```	_
	1				∖ plasticity, no to s	low dilatancy, no HCl rea	ction,		_
-						grained silica sand, white ment at 30.9', medium gr			-
-	1				graver sized riag	ment at oo.o , mediam gr			<del>-</del>
1 -	1						†		-
-	1								-
35	35.0						- 1		-
7.5	33.0				Clayey Sand (SC				
1 -	†	1.5	SS-8	2-3-1	35.0-36.5' - olive	black with grayish orange R 7/4), wet, very loose, ve	e mottling,		-
-	26.5			(4)	fine grained, no I	HCl reaction, 12% low to	medium		-
1 -	36.5				plasticity fines, si	ilica sand, some organic l	ines		<del>-</del>
-	1						-		-
-	1						-		-
-	1						-		-
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-06	SHEET	3	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724172.6 N, 457791.6 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 4.4 ft bo	gs on 4/26	5/07 5	START : 4/24/2007 END : 4/26/2007 LOGGER	R : B.	Ellis
				STANDARD	SOIL DESCRIPTION	ى ق	COMMENTS
A PONT	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		CLO	
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30LIG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
2.5	40.0			(14)	Clayey Sand (SC)		
_		1.5	SS-9	2-1-2	40.0-41.5' - Same as 35.0-36.0' except no HCl reaction, 16% fines, silica sand, varies in irregular		1
-	41.5			(3)	beds throughout		1
-						777	-
_							_
_					_		_
_					_		_
45 -2.5	45.0				Silt (ML)	<b>.</b>	-
-2.5		, ,	00.40	1-2-1	45.0-46.1' - black mottled with moderate yellowish		-
-		1.1	SS-10	(3)	brown (5Y 2/1 mottled with 10YR 5/4), wet, soft,	Ш	-
-	46.5				very fine to fine grained, silica sand	l	-
-					<del>-</del>	l	-
-					-		-
-					-		-
-					-	1	1
-						1	1
50	50.0				_	1	1
-7.5				0.4.4	<b>Fat Clay (CH)</b> ¬ 50.0-50.45' - Same as 45.0-46.1' except pale olive		
_		1.5	SS-11	0-1-1 (2)	\ mottled with light olive gray and moderate yellowish		_
_	51.5				brown, (10Y 6/2 mottled with 5Y 5/2 and 10YR 5/4), wet, soft, high plasticity, no dilatancy, no HCl reaction	//	_
-					Silty Sand (SM)		_
_					50.45-51.3' - moderate yellowish brown, (10YR 5/4), wet, very loose, very fine to fine grained, no HCl		-
-					reaction, silica sand, 20-25% low plasticity fines  Fat Clay (CH)		-
-					51.3-51.5 - Same as 50.0-50.45' except interbedded	•	-
-					fat clay (CH) with silty sand (SM)		
55	55.0				-		
-12.5	35.0				Silt (ML)	Ш	-
-		1.3	SS-12	34-44-50/4.5 (94/10.5")	55.0-56.3' - moderate yellowish brown, (10YR 5/4), moist, hard, low plasticity, rapid dilatancy, moderate		
_	56.4			(04/10.07)	HCl reaction, 5-10% fine to medium sand grained,	Ш	
					trace organics, all carbonate		1
] ]							]
_							]
_					_		_
-					_	l	
-					-		casing) -
60							



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-06	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724172.6 N, 457791.6 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER LEVELS : 4.4 ft bgs on 4/26/07 START : 4/24/2007 END : 4/26/2007 LOGGER : B. Ellis								
>00				STANDARD	SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE INTERVAL (ft)			STANDARD PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,	
TH BE	RECOVERY (ft)				MOISTURE CONTENT, RELATIVE DENSITY OR	BOLI	DRILLING FUID LOSS, TESTS, AND	
DEPT SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERA	ALOGY	SYM	INSTRUMENTATION
-17.5	60.8	0.2	SS-13	50/4	Silt (ML)	Г	T	10:48 Slight chatter while drilling
				(50/4")	60.0-60.2' - Same as 55.0-56.3' except light of brown, (5Y 5/6), moderate to strong HCl reac	ction /		
l -								11:03 Bringing up SS-13
-							1	_
-	-					-	-	-
-						-	┨	-
-	-						1	-
65	65.0						1	-
-22.5	65.4	0.2	SS-14	50/4.5			þ	11:22 Bringing up SS-14
-				(50/4.5")	65.0-65.2' - dusky yellow, (5Y 6/4), mild HCI	reaction,	1	11:41 Switching to core barrel
-					Begin Rock Coring at 65.5 ft bgs		1	_
					See the next sheet for the rock core log			
_								_
_							-	-
-							1	-
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70 <u> </u>	1						1	-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-06	SHEET	5	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724172.6 N, 457791.6 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.4	ft bgs	s on 4/	26/07 START : 4/24/2007 END : 4/	26/20	007 LOGGER : B. Ellis	
≥0≎	(9)			DISCONTINUITIES	ڻ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	E FE	(%) O	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	۵	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
무유	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	×ΜΕ	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
Оωш		ď	ΞЪ	<u> </u>	S		\M-t   -+00
_	65.5 R1-NQ 1 ft	0	2	65.5-65.7' - Bedding plane, horizontal, bedding change	Ш	Silt (ML) - 65.5-65.7' - very fine grained, some	Water level at 0.0 below ground surface (at
-	66.5 100%			65.8' - Fracture, 60 deg, rough, undulating	上	organics	surface); tooling in hole
-			0	66.2' - Mechanical break	┢	<b>Limestone</b> - 65.7-66.5' - yellowish gray, (5Y 7/2),	13:30 Coring R1-NQ
_					F	very fine grained, no to moderate	13:45 Coring R2-NQ
_			4	67.5' - Mechanical break	Ľ	HCl reaction, weak (R2), voids up to 1/16" over 20% of surface, poorly	_
				67.9, 68.0, 68.2' - Bedding plane (3), <5 deg, rough, undulating, open up to 1/8"	₽	fossiliferous, infill of yellowish gray	_
	R2-NQ 5 ft	77	1	68.1' - Fracture, 85 deg, rough, undulating,		(5Y 8/1) over < 5%, infill has	
	84%	11	'	open, no matching end 68.8' - Mechanical break	Ш	voids/fossils Limestone	
70			0	69.3' - Fracture, 60 deg, smooth, undulating	Н	- 66.5-67.9 and 68.5-69.8' - Same as	_
-27.5			U	69.8' - Mechanical break —	F	65.7-66.5' except no silt, light olive gray (5Y 5/2) from 67.9-68.5' voids	
-			0		Ľ	up to 1/16" over 30% of surface,	_
-	71.5		NR		₽	<ul> <li>fossiliferous (fossil casts up to 1"), dissolution features up to 1/8",</li> </ul>	-
1 -					Ш	bedding feature of grayish orange	13:59 Coring R3-NQ
-			1		ш	(10YR 7/4) from 67.6-67.7' is fine grained, none to trace voids, fossils	SC-1 collected at 71.5-
-				72.4' - Bedding plane, <5 deg, rough, undulating, with 0.4' of silt infill, very fine	Н	infill with light olive gray material	72.2'
-			0	72.2-72.6', has laminar organic layers within,	┢	- 69.8-70.7' - yellowish gray, (5Y 7/2), very fine grained, weak to medium	=
-	R3-NQ			up to 0.05' width	Ħ	strong (R2 to R3), trace voids up to	=
-	5 ft 99%	63	1	73.0' - Mechanical break 73.6' - Bedding plane, <5 deg, rough,	L	1/16", poorly fossiliferous, no dissolution on surface	=
75	. 3370			undulating	╁	No Recovery 70.7-71.5'	-
-32.5			1	73.9-74.0' - Mechanical break 74.7' - Bedding plane, <5 deg, smooth to	扛	Limestone 71.5-72.2' - Same as 65.7-66.5'	_
-				rough, undulating	士	except discontinuous organic	-
-	70.5		0	75.3, 75.8, 76.8' - Mechanical break (3)	╁╴	laminations over < 5% of surface up to 1/8"x1/4", infill occurs over 20% of	-
-	76.5		NR)	76.55, 76.7, 76.8' - Bedding plane (3), <5	F	surface	14:20 Coring R4-NQ
-			3	deg, rough to smooth, undulating, <5%	Ħ	_ 72.2-72.6' - very fine grained, has laminar organic layers within, up to	=
-	-			organics on fracture surface 77.3' - Mechanical break	Ł	1/2" width, dusky yellow (5Y 6/4) silt	=
-			4	77.85, 77.75' - Fractures (2), 10 deg, rough,	₽	infill 72.6-74.9' - light olive gray to very	=
-	R4-NQ			undulating, fracturing associated with dissolution, open up to 1/2"	┰	pale orange, (5Y 5/2 to 10YR 8/2),	-
-	5 ft	31	>10	78.2' - Fracture, 85 deg, smooth, undulating,	士	very fine grained, trace voids up to 1/16", 73.4-73.9' silt infill yellowish	-
-	76%			a fragment at 79.6' is missing 78.25' - Bedding plane, smooth to rough,	+	gray to very pale orange mottled with	-
80 <u> </u>			1	undulating, intersects 78.2'	F	very light gray (5Y 7/2 to 10YR 8/2 mottled with N8), 73.9-74.9',	-
-				79.0' - Bedding plane, <5 deg, smooth to rough, undulating, change in lithology, open	片	- 73.9-74.9' has infill of very pale	-
-			NR	up to 1/4"	世	orange with 20% tiny voids, matrix has trace voids up to 1/16", poorly	=
-	81.5			79.05' - Fracture, 85 deg, rough, undulating, open up to 1/8"	$+$ $\Box$	fossiliferous	_ 14:35 Begin R5-NQ
-			1	79.1-79.25' - Fracture zone, intersecting	ፗ	74.8-74.9' - moderate olive brown, (5Y 4/4), bedding layer with organics	Dog ( ) ( )
-				fractures 79.8' - Fractures, 65-70 deg, rough,	世	of olive gray (5Y 3/2) <1/16" thick	-
-			0	undulating, intersecting fractures	╁┼	+	=
-	DE NO			80.2' - Mechanical break 81.5-81.7' - Fracture zone	F	1	-
-	R5-NQ 5 ft	80	1	82.7' - Mechanical break	H	1-	SC-2 collected at 82.7-
-	92%			83.6' - Fracture, 10 deg, rough, undulating, fracturing associated with dissolution, open	₽	4	83.7'
85 <u> </u>			0	up to 1/2"	Ш	<del>-</del>	
-42.5				84.0' - Mechanical break	抻		
1							



FRACTURES PER FOOT

1

NR

0

1

1

0

10

3

1

0

NR

2

0

0

1

1

2

0

1

RQD(%)

100 1

WATER LEVELS: 4.4 ft bgs on 4/26/07

CORE RUN, LENGTH, AND RECOVERY (%)

> R6-NQ 5 ft

100%

R7-NC

5 ft

95%

R8-NQ

5 ft 100%

R9-NO

5 ft | 95

100%

95 1

42 | 1

86.5

91.5

96.5

101.5

DEPTH BELOW SURFACE AND ELEVATION (ft)

90

-47.<del>5</del>

95

-52 5

100

-57.5

105

-62.5

PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-06	SHEET	6	OF	9

#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724172.6 N, 457791.6 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

END: 4/26/2007

9

 $\underline{\circ}$ 

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

DISCONTINUITIES

84.2, 85.7' - Mechanical break (2)

<5 deg, smooth, undulating

87.3' - Mechanical break

89.0' - Mechanical break

<5 deg, rough, undulating

undulating, open up to 1/8"

89.7' - Mechanical break

infill is 93.5'-94.3'

START: 4/24/2007

DESCRIPTION

DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND

THICKNESS, SURFACE STAINING, AND TIGHTNESS

86.95' - Bedding plane or mechanical break,

89.15' - Bedding plane or mechanical break,

90.4' - Bedding plane, <5 deg, rough,

91.0, 91.7, 95.8' - Mechanical break (3)

92.2' - Fracture, 60 deg, rough, undulating

92.4' - Mechanical break 92.7' - Fracture, 60 deg, rough, undulating,

multiple missing pieces, intersecting fractures

93.0' - Fracture, 80 deg, rough, undulating 93.8' - Bedding plane, <5 deg, silt infill of yellowish gray color (5Y 7/2), milimeters thick

organic layers (discontinuous), thickness of

95.3' - Fracture, 60 deg, rough, undulating

96.65, 96.7' - Bedding plane (2), <5 deg,

98.9, 100.5' - Bedding plane or mechanical

break (2), <5 deg, rough, undulating 99.0' - Mechanical break

101.6' - Bedding plane, <5 deg, smooth,

103.35' - Bedding plane, 15 deg, smooth,

102.5' - Fracture, 70 deg, smooth, undulating

smooth, stepped, open up to 1/8'

98.05' - Mechanical break

99.9' - Mechanical break

100.6' - Mechanical break

102.55' - Mechanical break

104.0' - Mechanical break

undulating

undulating

ORIENTATION: Vertical LOGGER: B. Ellis LITHOLOGY COMMENTS ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS 74.9-76.45' - yellowish gray, (5Y 7/2), organic laminations (discontinuous) through <5% of surface up to 1/2"x1/4" and infill occurs over 20% 15:10 Begin R6-NQ of surface, tiny voids up to 1/16" over 20% surface, highly fossiliferous, casts and molds up to 1/2"x1", tiny voids decrease to 10% of surface at 75 7' No Recovery 76.45-76.5' Limestone 76.5-81.5' - weak to extremely strong (R2 to R6), 76.5-76.7' and 77.5-79.95' same as in R3-NQ from 72.6-74.9 except from 77.5- 78.65 has tiny voids on 5-10% of surface, 2"x1" cavities over <5% of surface. 76.7-77.5' same as 77.5-77.95' except no cavities/fossil molds, 15:28 Drill R7-NQ moderate yellowish brown (10YR 5/4) 79.0-80.3' same as 76.7-77.0' except from 79.1-80.0' has up to 1/16" voids over 10% of surface, extremely strong at 78.9' No Recovery 80.3-81.5' Limestone 81.5-86.1' - Same as 65.7-66.5' except weak to medium strong (R2 to R3), voids over 30% of surface, fossils up to 1/2"x1/4" (casts), infill of light gray (N7) over 5%, infill is very fine grained, trace voids up to 1/16' trace cavities features up to 1/8", infill 16:09 Drill R8-NO is approximately medium strong rock (R3), except 81.5'-81.8' is extremely weak to very weak rock (R0-R1) No Recovery 86.1-86.5' Limestone 86.5-91.5' - 86.5-90.0' dusky yellow, (5Y 6/4), 86.5-88.0' light gray (N7) to very pale orange (10YR 8/2), very SC-3 collected at 98.05-98.9 fine grained, 30% tiny voids up to , fossiliferous, fossil casts up to 1/4", trace very fine grained organics, infill is up to 10% light gray (N7) material voids, no visible fossils 89.4-89.6' bedding features up to 1/4", and olive gray (5Y 3/2), thin 16:10 Begin R9-NQ wavy laminations, 90.0-91.5' yellowish gray (5Y 7/2), mottled with light olive gray (5Y 5/2), very fine grained, voids from 0-10% (decreasing with depth) up to 1/16", trace fossil casts up to 1/4", weak to medium strong (R2 to R3) 91.5-91.7' - silt infill of yellowish gray color (5Y 7/2), discontinuous thin organic layers



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-06	SHEET	7	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724172.6 N, 457791.6 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.4	ft bg	s on 4	/26/07 START : 4/24/2007 END : 4/	26/20	07 LOGGER : B. Ellis	<u>.                                    </u>
≥O≎	(%			DISCONTINUITIES	١	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
AAGE	J.H.	(%) Q	F.00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ğ	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
무유의	ORE	Ø	AAC ER F	PLANARITY, INFILLING MATERIAL AND	ΥMB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
교외교	ZE C	ď	# #	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	,
_			1	104.9' - Bedding plane, <20 deg, rough, undulating, open up to 1/4"	┵	91.7-93.5' - very fine grained, trace voids to 1/16", trace fossils up to	
	106.5		'	105.6' - Fracture, 70 deg, smooth, undulating,		1/4", voids increasing with depth to	
				intersecting high angle fractures	┰	20% of surface	16:30 Begin R10-NQ
_			0			<ul> <li>94.3-96.25' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl</li> </ul>	1 7
-						reaction, very weak to weak (R1 to	1
-			0	107.8' - Mechanical break	+	<ul> <li>R2), voids to 1/4" over 30-40% of</li> </ul>	-
-	D40 NO				+	surface, voids to 1/2" at 94.55', fossiliferous	-
_	R10-NQ 5 ft	85	2	108.6' - Bedding plane, <20 deg, rough, undulating, open up to 1/8"	$\perp$	- No Recovery 96.25-96.5'	-
_	96%			109.0' - Mechanical break		Limestone	]
110				109.2' - Fracture, 75 deg, rough, undulating,	$\vdash$	96.5-101.5' - yellowish gray, (5Y 7/2), medium to fine grained, moderate to	
-67.5			1	open up to 1/8"		strong HCl reaction, very weak to	1
-				110.0' - Bedding plane, <5 deg, rough to smooth, undulating, open up to 1/8"	╁	weak (R1 to R2), voids up to 1/16"	1 1
-			0	3, 4, 4		over 20-30% of surface, fossiliferous (casts/molds)	1 1
-	111.5		NR)		₩	104.0-105.2' - yellowish gray, (5Y	16:45 Begin R11-NQ
-			1	111.7' - Bedding plane, <5 deg, smooth,	仜	<ul> <li>8/1), fine to medium grained, strong</li> </ul>	- 10.40 Begin RTT NQ
_				planar, open up to 1/8"	ᅪ	HCI reaction, very weak to weak (R1 to R2)	1 -
_			3	112.6, 112.7, 112.8' - Bedding plane (3), <5		105.2-106.5' - yellowish gray, (5Y	]
				deg, rough to smooth, undulating, open up to 1/8"	Н	8/1), fine to medium grained, strong	
	R11-NQ			113.6' - Mechanical break		HCI reaction, very weak to weak (R1 to R2), trace tiny voids up to 1/16",	1
_	5 ft 80%	72	0	114.0' - Mechanical break	╁	poorly fossiliferous, slight increase in	1 1
145	0070			114.6' - Mechanical break		fossil casts (approximately 10%)	1 1
115_ -72.5			0	114.0 - Wechanical break	╁	106.5-111.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong	1 -
-					┰	HCl reaction, very weak to weak (R1	1 -
_			NR		╁┰	to R2), fewer voids about 5% of rock	1 -
_	116.5				$\vdash$	No Recovery 111.3-111.5' - Limestone	l
l _			1			111.5-115.5' - from 111.5-112.7'	17:00 Begin R12-NQ
			'	117.0' - Fracture, 50 deg and 60 deg, rough,	Н	same as R10-NQ	
				undulating 117.5' - Fracture, 50 deg and 60 deg,	$\Box$	- At 112.7' color goes from yellowish gray (5Y 7/2) to light olive gray (5Y	1
_			1	smooth, undulating	╁	5/2) with depth, fine grained, voids	1 1
-	R12-NQ				亡	begin to increase with depth to 15%,	1 1
-	5 ft	78	1	118.7' - Bedding plane, smooth, undulating, open up to 1/8"	╀┼	fossil casts and molds increase to 20% up to 1/4"x1/8", has <5% infill	-
-	100%			119.0' - Mechanical break	$\perp$	<ul> <li>dusky yellow (5Y 6/4), with voids in</li> </ul>	]
120 77 5			2	119.4' - Mechanical break	╁╌	infill up to 30%-40% and size of infill is up to 1/8"x1/8"	-
-77.5 _				120.0' - Bedding plane, <10 deg, rough, undulating, open up to 1/4"	F	No Recovery 115.5-116.5'	]
			1	120.3' - Fracture, 85 deg, rough, undulating	$\vdash$	Limestone	]
	121.5			120.6' - Mechanical break	Ш	116.5-121.5' - Same as 106.5-111.5' except light olive gray (5Y 5/2) with	1
-				121.6, 121.7' - Bedding plane (2), <5 deg,	Ш	except light olive gray (51 5/2) with <5% very pale orange mottling, very	07:24 Water level at 4.4'
-			4	smooth, undulating, open up to 1/8"	+	fine to fine grained, trace fossils up	below ground surface -
-				121.9' - Fracture, 75 deg, rough, undulating,	世	to 1/4", casts and molds, trace tiny	07:31 Drilling R13-NQ
-			0	open up to 1/8" 122.25' - Bedding plane, 20 deg, rough,	+	voids up to 1/16" 119.4-120.6' medium grained,	-
-				undulating	上	extremely weak (R0) to weak (R2)	-
l -	R13-NQ 5 ft	79	1	123.0' - Mechanical break 123.6' - Fracture, 75 deg, rough, undulating,	$\vdash$	rock, up to 30% fossil casts up to 1/4", trace dissolution cavities up to	]
	100%		Ľ.	open up to 1/8"	片	1/4", trace dissolution cavities up to 1/4", 10% voids up to 1/16"	]
125				124.0' - Mechanical break	${\mathbb H}$	,	CO 4 collected = £404.0
-82.5			1	124.8' - Mechanical break	Ш		SC-4 collected at 124.0- — 124.8'
					1		1
					1		



PROJECT NUMBER:	BORING NUMBER:		
338884.FI	B-06	SHEET	8 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724172.6 N, 457791.6 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 4.4	ft bgs	on 4/	26/07 START : 4/24/2007 END : 4/	26/20	07 LOGGER : B. Ellis	
≥o.⊋	<u> </u>			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 130 -87.5 - - -	R14-NQ 5 ft 100%	87	1 1 2 1 0 1 1 4 1 0 0	125.1' - Bedding plane, <5 deg, smooth, undulating, associated with lithology change 125.5' - Mechanical break 126.3' - Bedding plane, 80 deg, rough, undulating, open up to 1/4" 126.6' - Bedding plane, <5 deg, rough to smooth, undulating, open up to 1/4" 127.8' - Bedding plane, <5 deg, smooth, stepped 128.25' - Bedding plane or mechanical break, <5 deg, rough, undulating 128.8-129.0' - Mechanical break 129.3' - Bedding plane, <5 deg, rough to smooth, undulating, open up to 1/4" 129.8' - Mechanical break 130.9' - Bedding plane or mechanical break, <5 deg, rough, undulating, open up to 1/4" 131.65, 131.7, 131.95, 132.5' - Bedding plane (4), <5 deg, smooth to rough, undulating, open <1/8" 133.3' - Fracture, 50 deg, rough, undulating, open up to 1/8" 133.8-134.3' - Mechanical break, multiple		Limestone  121.5-126.5' - Same as 111.5-115.5' except fine grained, very weak to weak (R1 to R2), various layers between dusky yellow (5Y 6/4) and yellowish gray (5Y 5/2) and light olive gray (5Y 5/2), fossils increasing from 125.4-126.5' up to 15%, casts and molds up to 1/2"x1/4" and trace organic features, <5% infill dusky yellow (5Y 6/4), with voids in infill up to 30-40% and size of infill is up to 1/8"x1/8"  Limestone 126.5-131.5' - Same as 121.5-126.5' except fine grained, extremely weak to weak (R0 to R2), fossiliferous layers have color change from light olive gray (5Y 7/2) 131.5-134.3' - Same as 126.5-131.5' except only one bedding feature is highly fossiliferous from 133.1-133.25', rock is extremely weak (R0) to very weak (R1)	07:42 Drilling R14-NQ
- 135_ -92.5 - -	56%		NR	fragments -		- No Recovery 134.3-136.5'  - -	- - - -
- - - - - 140 -97.5	R16-NQ 5 ft 50%	28	>10 0 >10	136.7-137.1' - Fracture zone, intersecting fractures 137.35' - Bedding plane, <5 deg, rough, undulating 138.3' - Mechanical break 138.75-139.0' - Fracture zone, intersecting fractures		Limestone  136.5-137.1' - yellowish gray, (5Y 7/2), fine grained, extremely weak to very weak (R0 to R1), fragments are very light gray (N7) to gray (N5), clasts are very weak (R1) to weak (R2), poorly fossiliferous  137.1-139.0' - light olive gray, (5Y 5/2), fine grained, very weak to medium strong (R1 to R3), dusky yellow (5Y 6/4) infill, 15-20% fossil casts up to 1/2"x1/4", trace voids up to 1/16" up to 30% of surface	08:13 Begin R16-NQ
- - - - - - 145_ -102.5	141.5 R17-NQ 5 ft 98%	90	1 1 2	142.2, 143.0, 144.0, 145.7, 145.9' - Bedding plane (5), <5 deg, smooth, undulating, open up to 1/8"  143.4' - Mechanical break		No Recovery 139.0-141.5'  Limestone  141.5-144.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine grained, medium strong to strong  (R3 to R4), very fine wavy bedding features ranging in color from yellowish gray (5Y 7/2), light olive gray (5Y 5/2) and olive gray (5Y 4/1), <5% voids up to 1/16", trace fossils, casts, trace cavities up to 1/8"	08:38 Begin R17-NQ



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-06	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724172.6 N, 457791.6 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

				IENT . CIVIE 33 3/14 3 10023, Mud Totally, INQ 1001S, HVV C	aonig	9	ORIENTATION : Vertical
<u>WATE</u> R	LEVELS: 4.4	ft bg	s on 4/	/26/07 START : 4/24/2007 END : 4/	<u> 26/20</u>	007 LOGGER : B. Ellis	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		<i>(</i> 0	DESCRIPTION	SYMBOLIC LOG		-
N E E	₹ <sub>A</sub> ₹	_	삤	DESCRIPTION	_ □	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
A A CI B	贤듀씨	(%) Q	⊉8	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	g	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
F F 및	S S S S S S S S S S S S S S S S S S S	ØΒ	AC R	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
밀양급	825	æ	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥ	CHARACTERISTICS	DROFS, TEST RESOLTS, ETC.
				145.5' - Mechanical break	ш	Limestone	
-			1		╁	144.0-146.4' - Same as 141.5-144.0'	_
l -	146.5		NR.		₽	except dusky yellow, (5Y 6/4), fine to	
				146.65, 146.8' - Bedding plane (2), <5 deg,		medium grained, extremely weak	09:42 Begin R18-NQ
_			4	smooth, undulating, open up to 1/4"	1_	(R0) at 146.0-146.4', zone at 144.5' and 145.3 are same as 136.5-137.1',	_
-				146.7' - Fracture, 75 deg, smooth, undulating	₽	extremely weak material (R0), rock at	_
-			0	147.35' - Bedding plane, <5 deg, smooth,	┸	- 141.5-144.0' is medium strong (R3)	_
			•	undulating 148.15' - Mechanical break		to strong rock (R4)	SC-6 collected at 147.35-
	R18-NQ			140.13 - Wechanical break	Н	No Recovery 146.4-146.5'	148.15'
-	5 ft	77	3	148.9' - Bedding plane, <5 deg, smooth,	┰	Limestone 146.5-151.1' - Same as 141.5-144.0'	_
_	92%			undulating, open up to 1/8"	╁	except interbedded with dusky yellow	<del>-</del>
150_			>10	149.4, 149.6, 149.9' - Bedding plane (3), <5	╨	(5Y 6/4) up to 1' thick, most beds are	
-107.5				deg, smooth, undulating, open up to 1/8"  149.75' - Mechanical break		thick with zones of thin wavy bedding	
1 -			1	150.05-150.15' - Fracture zone, intersecting	┰	from 150.75-151.1' is same as	_
1 -				fractures	₽	R10-NQ rock, 146.5-150.75' is	_
I -	151.5		NR	_ 150.8' - Bedding plane (<5), smooth,	口	medium strong (R3) to strong rock	
				\undulating, open up to 1/4"	1	(R4) No Recovery 151.1-151.5'	
_				\150.95' - Mechanical break	1	Bottom of Boring at 151.5 ft bgs on	_
-					1	4/26/2007	_
_					4	-	_
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PROJECT NUMBER:	BORING NUMBER:					
338884 FI	B-07	SHEET	1	OF	Ω	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724369.7 N, 457955.5 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	ATER LEVELS: 2.0 ft bgs on 5/4/07 START: 5/4/2007 END: 5/6/2007 LOGGER: P. De Sa'rego, R. Bitely										
				STANDARD	SOIL DESCRIPTION	ď	COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME TIGOGO COCCUS CARACTER COCCUS	SYMBOLIC LOG	DEDTIL OF CACING SOULING SATE				
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30LIG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND				
SURF SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYME	INSTRUMENTATION				
43.1	0.0			(. •)	Poorly Graded Sand With Organics (SP)						
-		1.0	SS-1	0-2-1	0.0-1.0' - dark gray grading to very light gray, (N3 to N8), moist, very loose, very fine to fine grained silica		1				
-	1.5			(3)	$\bigcap$ sands, trace nonplastic fines, 10% organics and roots $\bigcap$		Using 2' x 2" split spoon for SPT				
					decreasing with depth, last 2.4' is dark yellowish brown (10YR 6/6) with 5% nonplastic fines, trace		]				
_					concretions to 1/2"		_				
-					-	-	_				
-					-	1	-				
-					-	ł	-				
	<b>5</b> 0				-	1	-				
5 38.1	5.0				Poorly Graded Sand (SP)		SS-2 taken 09:47				
-		0.9	SS-2	3-3-2 (5)	5.0-5.9' - very pale orange, (10YR 8/2), wet, loose, very fine to fine grained silica sands, trace nonplastic		Assumed water level at 2.0' due to moisture - content in SS-2 and water level				
-	6.5			(3)	fines, trace sand-sized black particles	1	measurements at B-9				
					_						
_					_	1	_				
_					-	-	_				
-					-	-	-				
-					-	┨	-				
10	10.0				-	1	-				
33.1	10.0				Poorly Graded Sand With Silt (SP-SM)	111	SS-3 taken 09:53				
-		1.0	SS-3	3-3-5 (8)	10.0-11.0' - white to very light gray, (N9 to N8), very fine to fine grained silica sands, 10% nonplastic fines,		Similar to SS-2				
	11.5			(0)	sand-sized black particles		]				
_					_						
_					<u>-</u>	1	_				
-					-	-	-				
-					-	ł	-				
-					-	$\mathbf{I}$	-				
15	15.0				-	1	-				
28.1	13.0				Poorly Graded Sand With Silt (SP-SM)	10	SS-4 taken 09:57 —				
-		0.9	SS-4	3-3-4 (7)			] 1				
	16.5			(1)	7% nonplastic fines, trace very fine sand-sized black particles	1	]				
-											
-					-	1					
-					-	-					
-					-	-	-				
-					-	$\mathbf{I}$	-				
20					-	1	-				
						1					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-07	SHEET	2	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724369.7 N, 457955.5 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 2.0 ft bo	gs on 5/4/	/07 5	START : 5/4/2007 END : 5/6/2007 LOGGER	R : P.	P. De Sa'rego, R. Bitely			
				STANDARD	SOIL DESCRIPTION	g	COMMENTS			
AND A	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		Š				
ACE TOI		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION			
23.1	20.0			(14)	Silty Sand (SM)	111	SS-5 taken 10:07			
-		1.1	SS-5	4-5-5	20.0-21.1' - palé yellowish brown, (10YR 6/2), wet, loose, no HCl reaction, very fine to fine grained silica		1			
-	21.5			(10)	sands, 20% nonplastic fines		1			
-	21.0				-	1	1			
-					-	1	1			
-					_		1			
_					_		_			
_					_		_			
25 18.1	25.0				Cillus Const (CM)	TELL	CC Catalyan 10:10			
10.1			00.0	2-2-2	Silty Sand (SM) 25.0-26.5' - pale brown, (5YR 5/2), wet, very loose, no -		SS-6 taken 10:13			
-		1.5	SS-6	(4)	HCl reaction, very fine to fine grained silica sands, 20-25% nonplastic fines		-			
-	26.5				20 20 /0 Horipiadao IIIIdo	111	-			
-					-	-	-			
-					-		-			
-					-		1			
-					-		-			
-					<del>-</del>		1			
30	30.0				_		1			
13.1				0.04	Poorly Graded Sand With Silt (SP-SM) 30.0-31.5' - yellowish gray, (5Y 7/2), wet, very loose, -		SS-7 taken 10:20			
l _		1.5	SS-7	2-2-1 (3)	no HCl reaction, very fine to fine grained silica sand,	ļij	_			
_	31.5			, ,	6% nonplastic fines, trace very fine sand-sized black particles	iļi				
_					_	l	_			
_					-	ł	-			
-					-	ł	-			
-					-	ł	-			
-					-	1				
35	35.0				-	1	-			
8.1	33.0				Poorly Graded Sand With Silt (SP-SM)		SS-8 taken 10:25			
-		1.5	SS-8	1-1-1 (2)	35.0-36.5' - Same as 30.0-31.5' except yellowish gray, trace medium bluish gray mottling, (5Y 8/1 trace 5B		] 1			
-	36.5			(2)	7/1)		1			
							]			
-										
-					_					
-					-		]			
-					-		-			
-					-	-	-			
40						$\vdash$				



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	B-07	SHEET	3	OF 8	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724369.7 N, 457955.5 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 2.0 ft bo	gs on 5/4/0	07 5	START : 5/4/2007 END : 5/6/2007 LOGGER : P. De Sa'rego, R. Bitely
				STANDARD	SOIL DESCRIPTION COMMENTS
LOW AND N (#)	SAMPLE	INTERVA	.L (ft)	PENETRATION TEST RESULTS	
H BE ACE ATIO		RECOVE	:RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  BY OF CONSISTENCY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
3.1	40.0			(14)	Poorly Graded Sand With Silt (SP-SM) SS-9 taken 10:45
-		1.5	SS-9	2-2-3 (5)	40.0-41.5' - yellowish gray, (5Y 8/1), wet, loose, no HCl reaction, very fine to fine grained silica sand, 11%
-	41.5			(5)	nonplastic fines, trace pyrite fragments Till Driller's Remark: Switched to 2-7/8" tricone
-	11.0				drag bit
-					1
1 [					]
					]
_					]
_					]
45	45.0				
-1.9				2-2-3	Poorly Graded Sand With Silt (SP-SM)
-		1.5	SS-10	(5)	
-	46.5				1111
-					
-					
-					
-					
-					
50	50.0				
-6.9	30.0				Poorly Graded Sand With Silt (SP-SM) SS-11 taken 10:57
-		1.5	SS-11	0-1-1 (2)	50.0-51.5' - moderate yellowish brown to pale yellowish brown, trace medium dark gray mottling,
_	51.5			(2)	(10YR 5/4 to 10YR 6/2 with N4), wet, very loose, no
					HCl reaction, very fine to fine grained silica sand, 6% recorded as 0-1-1 (2) nonplastic fines
_					] ]
-					] ]
_					]
_					
55 <u> </u>	55.0				Poorly Graded Sand With Silt (SP-SM)   Filt   SS-12 taken 11:06
-11.5		4 -	SS-12	0-1-1	55.0-56.5' - Same as 50.0-51.5' except medium dark
-		1.5	55-12	(2)	gray to dark gray (N4 to N3) mottling
-	56.5				
-					
-					
-					1
-					1
-					1
60					1
1	l			i	1 1



PROJECT NUMBER:	BORING NUMBER:				_
338884.FL	B-07	SHEET	4 OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724369.7 N, 457955.5 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 2.0 ft bo	gs on 5/4/	07 5	START : 5/4/2007 END : 5/6/2007 LOGGE	R : P	. De Sa'rego, R. Bitely
				STANDARD	SOIL DESCRIPTION	ű	COMMENTS
AND N (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR	BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYM	INSTRUMENTATION
-16.9	60.0				Poorly Graded Sand With Silt (SP-SM)	H	SS-13 taken 11:11
		1.4	SS-13	0-1-2 (3)	60.0-61.4' - Same as 50.0-51.5' except dusky blue, (5PB 3/2), trace concretions		- - -
_	61.5			(-)		盐	 _
-						1	-
-						-	-
-						1	-
-						1	-
-						1	SS-14 has a jumbled appearance
65	65.0					1	-
-21.9				F 0 40	Clay With Gravel (CL) 65.0-66.4' - mottled grayish blue green and medium		SS-14 taken 13:10
_		1.5	SS-14	5-6-12 (18)	dark grav. (5BG 5/2 and N4), moist to wet, very stiff.		_
-	66.5				high plasticity, no dilatancy, 20% fine to coarse gravel, carbonate derived, rounded to subrounded; silty sand	-1//	-
-					(SM) lens at 66.0', 3.0' thick, white (N9) to yellowish gray (5Y 8/1), fine to coarse sand-sized carbonate	4	-
-					material, gravel and silty sand have very strong HCl reaction, clay has no HCl reaction	-	-
-					reaction, clay has no from reaction	1	-
-						1	-
						]	
70	70.0					1	
-26.9				2-2-3	Silty Sand (SM) 70.0-71.4' - yellowish gray, (5Y 8/1), wet, very loose, no HCl reaction, very fine to fine grained silica sands,	1	SS-15 taken 13:26
-		1.4	SS-15	(5)	no HCl reaction, very fine to fine grained silica sands, 25% low plasticity fines, scattered irregular pockets of	4	-
-	71.5				fat clay (CH), grayish blue green (5BG 5/2), high plasticity, 15-20% is fat clay	╬	-
-					plasticity, 15-20% is fat clay	-	-
-						1	-
						]	
] -						1	
-						1	-
75 <u> </u>	75.0				─ Fat Clay (CH)		
31.3		1.5	SS-16	4-2-1	$\sqrt{75.0-75.2}$ - moderate yellowish brown, (10YR 5/4),	44	1
-	76.5		55 15	(3)	wet, soft, high plasticity, no dilatancy, sandy seam Poorly Graded Sand With Silt (SP-SM)	11	- 
-	70.0				75.2-76.5' - very pale orange heavily mottled with dark gray, (10YR 8/2 with N4), wet, very loose, very fine to	1	-
					fine grained silica sand, 10% nonplastic fines, trace very fine sand-sized black particles	]	
[ ]					very fine sand-sized black particles	1	
-						1	-
-						-	-
						+	-
80						+	
1							



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-07	SHEET	5	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724369.7 N, 457955.5 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 2.0 ft bo	gs on 5/4/	07 5	START : 5/4/2007 END : 5/6/2007 LOGGEF	R : P.	: P. De Sa'rego, R. Bitely					
				STANDARD	SOIL DESCRIPTION	(J	COMMENTS					
LOW AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		)	DEDTH OF CACHAO DRIVING DATE					
ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30LI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND					
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION					
-36.9	80.0			(,	Silty Sand (SM)		SS-17 taken 14:27					
-		1.5	SS-17	1-1-2 (3)	80.0-81.5' - pale yellowish brown, (10YR 6/2), wet, very loose, trace medium gray laminated mottling,		1					
-	81.5			(3)	very fine to fine grained silica sand, 25% nonplastic fines, trace very fine sand-sized black particles	1	1					
					illies, trace very line sand-sized black particles							
_					_		Driller's Remark: Light to medium chatter observed while drilling to 85'					
-					-	1	-					
-					-	-	-					
-					-	┨	-					
	05.0				-	┨	-					
85 <u> </u>	85.0 85.3	0.3	SS-18	50/3	_ Clayey Sand (SC)	1//						
-				(50/3")	85.0-85.4' - mixed silty sands, fat clays (SM, CH), fat clay is mottled olive black (5Y 2/1) and grayish black	1	-					
-					(N2), silty sand is dark yellowish brown (10YR 4/2)	1	Driller's Remark: Switch to 2-7/8" tricone					
					with black streaks, wet, very loose/soft, trace medium to coarse sand-sized carbonate material with		roller bit at 15:07 - SS-18 may be slough					
					moderate HCl reaction, no HCl reaction in silty sands or fat clays		]					
_					or lat diayo		_					
_					<u>-</u>		_					
_					-	1						
-					-	1	-					
90 <u> </u>	90.0				Silt (ML)	НП						
-		1.4	SS-19	4-19-26	$\sqrt{90.0-90.4}$ - yellowish gray, (5Y 8/1), nonplastic, rapid $\sqrt{-90.4}$		-					
-	91.5		00 13	(45)	dilatancy, moderate to strong HCl reaction, very thinly laminated (<1/16" thick) with olive black (5Y 2/1)		<del> </del>					
-	31.3				(organics), all carbonate Silty Sand With Gravel (SM)	Ħ	]					
-					90.4-91.4' - vellowish gray, (5Y 8/1), wet, dense,	1	1					
					strong HCl reaction, fine to coarse sand-sized, 20% fine to coarse gravel-sized, 30% nonplastic fines, all							
					carbonate							
-					_	1						
-					-	-						
95 <u> </u>	95.0				Sandy Clay With Silt (CL-ML)		SS-20 taken 15:51					
-		1.5	SS-20	0-7-47	95.0-96.5' - yellowish gray, (5Y 8/1), moist, hard, low -		- Lo Lakell 10.01					
-	06.5	1.5	33-20	(54)	plasticity, rapid dilatancy, strong HCl reaction, greenish black (5GY 2/1) mottling at 95.8', 10-15%		Weight of hammer for first 6"					
-	96.5				fine to medium sand-sized, trace organics in pockets		1 <sup>-</sup> -1					
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-					-	1	1					
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PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	B-07	SHEET	6	OF 8	3	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724369.7 N, 457955.5 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 2.0 ft b	gs on 5/4/	07 5	START : 5/4/2007 END : 5/6/2007	LOGGER	: P.	De Sa'rego, R. Bitely
300				STANDARD	SOIL DESCRIPTION		G	COMMENTS
AND AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOF	ь	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE ACE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY C	OR .	BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALC	OGY	SYM	INSTRUMENTATION
-56.9	100.0	0.5	SS-21	38-50/2	Silty Sand (SM)	EV 7/0	П	SS-21 taken 17:03
	100.7			(88/8")	100.0-100.5' - yellowish gray to very light gray, (to N8), wet, very dense, strong HCl reaction, fine	e to /		_
l _					coarse sand-sized, 25% low plasticity fines, 10% gravel-sized, all carbonate	% fine / _		11:50 100% circulation loss at 101.0' Switch to 2-3/8" tricone roller drill bit –
-					(g. 41. c. c. c. c. c. c. c. c. c. c. c. c. c.			_
-						_		5/5/07 water level taken 08:38, 4.4' below ground surface -
-						_		09:30 65.0' 4" HW casing installed Driller's Remark: Will use 2-7/8" tricone drag
-						-		bit to advance boring, AWJ rods
_						-		-
105	105.0					-		-
-61.9	100.0				Silty Sand (SM) 105.0-105.9' - yellowish gray, (5Y 7/2), wet, med	di	Ш	Light chatter while drilling with drag bit
		0.9	SS-22	10-6-23 (29)	- dense, strong HCl reaction, fine to coarse sand-	sized,		_
-	106.5			. ,	\dagger 35% low plasticity fines, 10% fine to coarse \dagger gravel-sized, all carbonate	/_		10:40 Driller's Remark: Reached 90.0-91.0' and lost complete circulation -
_					(g. 41. c. c. c. c. c. c. c. c. c. c. c. c. c.			Installed 4" HW casing to 105.0' below
_						_		ground surface
-						_		-
-						-		-
-						-		-
110	110.0					-		-
-66.9	110.0				Silty Sand With Limestone Fragments (SM)	N17)	Ш	SS-23 taken 14:55
		1.5	SS-23	13-22-11 (33)	110.0-111.5' - very light gray to light gray, (N5 to wet, dense, strong HCl reaction, fine to coarse	,.		
_	111.5			(00)	sand-sized, 35% fine to coarse gravel-sized lime fragments, 20% low plasticity fines, material is	estone		_
_					carbonate and highly fossiliferous	/ _		_
_						_		-
-						_		-
-						-		-
1 -						_		-
115	115.0					-		-
-71.9	110.0				Silty Sand With Limestone Fragments (SM)		Ш	SS-24 taken 15:13
		0.9	SS-24	7-2-29 (31)	115.0-115.85' - Same as 110-111.5'			Last SPT on 5/5/07
_	116.5			, ,		_		_
-						-		-
-						-		-
-						-		-
-						_		-
1 -						_		-
120						-		-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-07	SHEET	7	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724369.7 N, 457955.5 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 2.0 ft b	gs on 5/4/	07 5	START : 5/4/2007 END : 5/6/2007 LOGGEF	R : P	: P. De Sa'rego, R. Bitely					
				STANDARD	SOIL DESCRIPTION	(J	COMMENTS					
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLIC LOG						
		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	l S	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND					
HPT.			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	MB	INSTRUMENTATION					
-76.9	120.0			(N)	Silty Sand With Limestone Fragments (SM)	S	Start drilling on 5/6/07 at 8:05					
-70.9	120.0		00.05	13-18-19	120.0-121.8' - yellowish gray, (5Y 8/1), wet, dense,	4  -	Water level at 6.4' below ground surface at					
-		1.5	SS-25	(37)	strong HCl reaction, fine to coarse sand-sized, 42% low plasticity fines, 15-20% fine fragments-sized	4	beginning of day					
-	121.5				carbonate derived, highly fossiliferous with molds and	4	4					
-					casts		-					
-					-	-	_					
-					-	-	-					
_					-	-	-					
-					-	-	-					
-					-	1	-					
125_ -81.9	125.0				Silty Sand With Limestone Fragments (SM)	100	Driller's Remark: Continued circulation loss					
-	125.9	0.9	SS-26	37-50/5 (87/11")	125.0-125.9' - Same as 120-121.8' except 25-30% -	-	from 120-125' - gained a little back at 125.0'					
-	125.9			(- ' /	gravel-sized material in wafer-like lenses up to 1/4"-1/2" thick	₩	-					
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-					-	┨	-					
-					-	1	-					
-					<del>-</del>	1	-					
-					-	1	-					
-					-	1	-					
-	,,,,,				-	┨	-					
130 <u> </u>	130.0	0.4	SS-27	50/5.5	Silty Sand With Limestone Fragments (SM)		Driller's Remark: 130-135' drilled fairly hard					
-	130.5	0.7	00 27	(50/5.5")	130.0-130.4' - Same as 125.0-125.9' except trace	Ħ	and consistent -					
-					organic magnificities	1	-					
-					-	1	1					
-					-	1	-					
-					-	1	<u> </u>					
-					-	1	1					
-					-	1	1					
-					-	1	1					
135	135.0				<del>-</del>	1	1					
-91.9		0.1	SS-28	50/4.5	Limestone Fragments	t	1 7					
				(50/4.5")	\\\135.0-135.1' - strong HCl reaction \\ \frac{1}{2}	1	1					
					_	1	Chatter at 136-136.5'					
					_	1	Driller's Remark: Harder -					
	137.5		00.55			1_	End soil sampling at 10:35 on 5/6/07					
	137.6	0.0	\SS-29 /	50/2 (50/2")	No Recovery 137.5-137.6' Begin Rock Coring at 137.5 ft bgs		Switch to rock coring, see rock core log					
				\	See the next sheet for the rock core log		]					
					_		]					
							]					
140												
1			1			1						



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-07	SHEET	8	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724369.7 N, 457955.5 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

				HENT : CIVIE 33 3/N 3 10023, Midd Totally, NQ 1001S, HW C			ORIENTATION : Vertical
WATER	LEVELS : 2.0	ft bg	s on 5		<u>6/200</u>		
≥0≎	્ર			DISCONTINUITIES	စ္က	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OUTE AND DEDTH OF GARNING
ᆱ႘ᆮ	Ş, H	(%) Q	URE		1 🖺	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
YFA YFA	SGTE	) D	CT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	₽G	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
	SHE S	ő	FRA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	ξ	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
В 07 Ш	137.5			·	<u>"</u>	Limontono	Driller starts with resurbit
_	137.5		7	137.6-137.8' - Fractures (3), horizontal,	H	<b>Limestone</b> - 137.5-138.7' - yellowish gray, (5Y	Driller starts with new bit:  Boart Longyear Alpha bit -
			'	smooth to rough, undulating to stepped, heavy drill action marks, open		8/1), strong HCl reaction, medium	4050089 NQ 06 R8 at 155
_				137.9' - Fracture, horizontal, rough, stepped,	╁	strong (R3), banded with silt lenses	Limestone from 137.5-
-	R1-NQ		3	possible black staining over 50% of surface,	╁	<ul> <li>between 1/4" and 2", small voids to</li> </ul>	151.5' appears to be -
_	4 ft	35		with 1/4" relief, lower side smooth and planar		1/16" over 25% of surface in a few	detrital limestone
140	75%	00	4	with wear from drilling, black staining with		lenses, trace fossil molds, casts, — cross-bedding from 138.5-138.7',	
-96.9			1	embedded particles over 60% of surface	╁	strongly cemented	
-				138' - Bedding plane, <5 deg, rough, undulating, 1/16" relief, open		138.7-139.2' - Same as 137.5-138.7'	R1: 8 minutes
_			NR	138.35' - Bedding plane, 15 deg, rough,	+	<ul><li>139.2-140.5' - very weak (R1),</li></ul>	-
	141.5			planar, tight		becomes more massive, highly	_
				138.4' - Bedding plane, horizontal, bottom	$\vdash$	fossiliferous with molds, casts, clasts of different limestone, subrounded,	
1 7			3	surface is rough, undulating, heavy wear on	ҥ	moderately cemented	SC-1 collected at 142.1-
-			$\vdash$	upper side from drilling, <1/16" relief, open 138.7' - Mechanical break	Ė	No Recovery 140.5-141.5'	143.1'
-			2	138.9' - Fracture, 60 deg, rough, undulating,	$oldsymbol{\sqcup}$	Limestone	] -
			ا ـــــــــا	3/16" relief, tight	h	141.5-143.5' - yellowish gray, (5Y	
1 7	R2-NQ			139.3' - Bedding plane, horizontal, rough,	C.	8/1), strong HCl reaction, very weak	]
_	5 ft	76	1	undulating, rock weak from drilling in upper	₩	to weak (R1 to R2), very few voids of any size, massive appearance,	-
_	100%			surface, open 139.45' - Fracture, 5 deg, rough, undulating,	łт	scattered black grains (pyrite), trace	-
145			4	1/16' relief, tight —		fossils	
-101.9				139.6' - Fracture, 60 deg, rough, undulating,		143.5-144.4' - strong HCl reaction,	
				1/16' relief, tight		becomes banded with gray particles	R2: 17 minutes
_			0	140.1' - Mechanical break	1	L throughout, 50% of surface covered with voids to 1/16"	=
_	146.5			141.6' - Mechanical break, 0-90 deg, rough,	₽	144.4-146.5' - moderate HCl	-
			4	undulating, <1/16" relief, open 141.8, 142.1' - Fractures, 70 deg, rough, -		reaction, medium strong (R3), trace	_
			-	undulating, 1/16" relief, tight	Н	voids to 1/16", trace fossil molds,	
_				143.3' - Fracture, 80 deg, rough, undulating,		- casts	1
-			1	1/16" relief, accretions of iridescent pyrite		145.3-146.5' - mild to moderate HCl reaction, infilling in two 1.2" thick	-
_				covering 30% of surface, tight	┢┌	- bands	_
	R3-NQ 5 ft	60	1	143.6' - Fracture, 70 deg, rough, undulating, up to 1/16" relief, tight		146.5-150.3' - yellowish gray, (5Y	
	76%	00	'	143.85' - Mechanical break	Ш	8/1), strong HCl reaction, very weak	
150				144.1-144.4' - Bedding plane, 0-5 deg, rough,	H	to weak (R1 to R2), highly	_
150_ -106.9			1	undulating, open	Ė	fossiliferous (molds, casts), echinoderms, brownish black	
				144.6-145.5' - Fracture, vertical, undulating 145.9' - Mechanical break	$\vdash$	- laminations over 146.5-146.8', voids	l
			NR	146.6' - Bedding plane, horizontal, rough,	Н	<1/16" over 30-35% surface over	R3: 8 minutes
	151.5			undulating, open 5/8"		149.4-150.3', particles in rock matrix	_
-	.51.0			146.7' - Bedding plane, horizontal, rough,	<b>T</b> '	(medium dark gray particle, fossil mold fragments, fossils) give the	Assume core loss from
-				undulating, open 1/8", organics covering	1	appearance of being fine to medium	bottom of run. Finish -
				50-70% surface 146.8' - Bedding plane, horizontal, rough,	1	grain textured rock	drilling at 13:00.
				undulating, open 1/8", organics covering	1	No Recovery 150.3-151.5'	Abandoned on 5/7/07 with
1 7				50-70% surface	1	Bottom of Boring at 151.5 ft bgs on	61 bags of Bonsal or – Quikrete brand Portland
-				147.3' - Bedding plane or mechanical break,	1	- 5/6/2007	Type I/II or Type I cement
-				horizontal, rough, undulating, open 1/8"	1	-	(47-lb bags) grouted to
				147.8' - Fracture, 30 deg, rough, undulating, tight	1	_	surface
				149.4' - Fracture, horizontal, rough,	1		
1 7				undulating, tight	1		
-				149.7' - Bedding plane, 20 deg, rough,	1	-	
-				undulating, fossil fragment at surface of	1	-	-
				break, open up to 3/8"	1	<u>-</u>	]
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				_	1		1
					1	-	-
					1		
					1		



PROJECT NUMBER:	BORING NUMBER:					
338884 FI	B-07A	SHEET	1	OF	۵	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724358.9 N, 457965.5 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" drag bit

VALATED		4.5.0.1			77 1000/3, Illuu lolai				ONIENTATION : Vertical
WATER	LEVELS	: 4.5 ft bo	gs on 6/16		START : 6/15/2007	END: 6/17/2007 SOIL DESCRIPTION	LOGGER	: : N.	Jarzyniecki COMMENTS
≥⊕⊋	04451	INITEDIC	1 (4)	STANDARD PENETRATION		JUIL DEJURIT HUN		9g	CONNINIENTO
NAN (	SAMPLE	INTERVA	` ,	TEST RESULTS	SOIL NAME	E, USCS GROUP SYMBOL,	COLOR	CLC	DEPTH OF CASING, DRILLING RATE,
ACE		RECOVE	RY (ft)		MOISTURE	CONTENT, RELATIVE DEN	ISITY OR	30LI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	CONSISTENC	CY, SOIL STRUCTURE, MIN	IERALOGY	SYMBOLIC LOG	INSTRUMENTATION
43.2	0.0			(N)	Poorly Graded	Sand With Organics (SP	<u> </u>		
-	0.0		00.4	2-2-3	0.0-1.2' - mediu	m dark grav grading to ve	rv light grav. –		-
-		1.2	SS-1	(5)	(N4 to N8), mois	st, loose, fine grained, no nonplastic fines, 20% orga	HCI _		-
_	1.5				roots decreasing	g with depth, silica sand			-
_						<u> </u>			_
l _	]						_		_
							_		
							_		
_	1						_	1	_
5	5.0						_		-
38.2	0.0				Poorly Graded	Sand (SP)			<del></del>
-	-	1.0	SS-2	7-7-6	5.0-6.0' - white t	o yellowish gray, (N9 to 5 fine grained, no HCl reac	Y 8/1), wet, -		<del>-</del>
-			002	(13)	nonplastic fines	, silica sand	lion, trace		-
-	6.5					,			-
-							-		-
_	-						-		-
_	1						_		-
_							_		_
l _							_		_
10	10.0								
33.2					Poorly Graded			Ш	
-	1	1.0	SS-3	7-9-8 (17)	\10.0-10.1' - Sam Silty Sand (SM)				-
_	11.5			(17)	\ 10.1-11.0' - stre	aked light gray to medium	n gray, (N7 to $\int$	11:1	-
-	11.0				N5), moist to we	et, medium dense, very fin reaction, 15% low to med	ne to fine		-
-	-				fines, silica sand	d	Julii piastic   _		-
-	1								-
-							-		-
-	-						-		-
-	-						-		-
-							-		-
15	15.0				Beerle C. L.	O		<u> </u>	
28.2	]			5-8-11	15.0-15.9' - velic	Sand With Silt (SP-SM) owish gray, (5Y 8/1), wet,	medium -	開	_
1 -		0.9	SS-4	(19)	dense, very fine	to fine grained, no HCl re	eaction, 10%	$\Gamma_{\rm eff}$	_
<b>1</b> _	16.5			, ,	\nonplastic fines.	, silica sand	/ _		_
1							_		
1 -							_		
1 -							_		
1 -	1						-		-
1 -	1						-		-
1 -	1						_		-
	-						_		-
20		<del>                                     </del>						$\vdash$	
1									



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-07A	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724358.9 N, 457965.5 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" drag bit

WATER	LEVELS	: 4.5 ft bo	gs on 6/16	6/07	START : 6/15/2007 END : 6/17/2007 LOGGER : N	N. Jarzyniecki
>				STANDARD	SOIL DESCRIPTION	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE,
TH BI		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR	DRILLING FUID LOSS, TESTS, AND
DEP- SURI ELE/			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	INSTRUMENTATION 5
23.2	20.0				Poorly Graded Sand With Silt (SP-SM)	1.65' recovery noted on log
		1.5	SS-5	6-6-7 (13)	20.2-21.5' - yellowish gray, (5Y 8/1), wet, medium dense, very fine to fine grained, no HCl reaction,	
l _	21.5			( - /	5-10% nonplastic fines, silica sand	<u>i</u>
-					_	_
-					-	-
-					-	-
-					-	-
-					-	-
25	25.0				-	-
18.2	20.0				Poorly Graded Sand With Silt (SP-SM) 25.0-26.5' - Same as 20.0-21.5'	2.0' recovery noted on log
-		1.5	SS-6	7-3-2 (5)	25.0-26.5' - Same as 20.0-21.5'	<u>.</u>
	26.5			(0)		<u>.</u>
l _					<u> </u>	
_					_	_
-					-	-
-					-	-
-					-	-
30	30.0				-	-
13.2	30.0				Silty Sand (SM)	1.7' recovery noted on log
-		1.5	SS-7	1-2-2 (4)	30.0-31.5' - yellowish gray, (5Y 7/2), wet, loose, fine grained, no HCl reaction, 15-20% nonplastic fines,	
_	31.5			(4)	silica sand	1
_					<u> </u>	
-					_	_
-					-	-
-						-
	05.0				-	-
35 8.2	35.0				Poorly Graded Sand With Silt (SP-SM)	1.75' recovery noted on log
-		1.5	SS-8	2-1-2	35.0-36.5' - yellowish gray, (5Y 7/2), wet, very loose, very fine to fine grained, no HCl reaction, 8%	\  \  \  \  \  \  \  \  \  \  \  \  \  \
-	36.5			(3)	nonplastic fines, silica sand	<b>√</b>
					]	
_						_
-						-
-						-
						-
40					-	



PROJECT NUMBER:	BORING NUMBER:				
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724358.9 N, 457965.5 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" drag bit

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 1860/3, mud rotary, cathead, NW rods, 3-//8" drag bit  ORIENTATION: Vertical											
WATER	LEVELS	: 4.5 ft bo	gs on 6/16	5/07	START : 6/15/2007 END : 6/17/2007	LOGGER	: N.	Jarzyniecki			
1.				STANDARD	SOIL DESCRIPTION		(T	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION			SYMBOLIC LOG				
H H H		RECOVE	DV (ft)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL	., COLOR,	임	DEPTH OF CASING, DRILLING RATE,			
H H H		I NECOVE	<u> </u>		MOISTURE CONTENT, RELATIVE DE	NSITY OR	8	DRILLING FLUID LOSS, TESTS, AND			
교육교			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, M	INERALOGY	ξ	INSTRUMENTATION			
3.2	40.0			(14)	Silty Sand (SM)		1111	Driller's Remark: Weight of hammer causes			
- 0.2	40.0			1-1-2	40.0-41.5' - Same as 35.0-36.5' except	oale vellowish -		2' rod drop from 37-55'			
1 _		1.5	SS-9	(3)	grav. (5Y 8/1), 20% nonplastic fines, bla	ck (organic) _		2.0' recovery noted on log			
	41.5			. ,	staining from 40.5-40.6'						
-								1			
-						-	1	-			
-						-	l	-			
_						_	1	_			
l _						_		_			
						_	1				
15	45.0					_	İ	1			
45 -1.8	45.0				Silty Sand (SM)		177	1.8' recovery noted on log			
-		٠_	00.40	1-1-2	45.0-46.5' - Same as 40.0-41.5' except 2	25% -		- 1.5 10001017 Hoted 011 log			
-		1.5	SS-10	(3)	nonplastic fines, trace black (possibly or	ganic) _		_			
1 _	46.5				staining from 45.25-45.35'						
_						_	İ	1			
-						-	l	1			
_						-		-			
-						_		_			
1 _						_	l	_			
50	50.0					_	1	1			
-6.8	30.0				Silty Sand (SM)			1.75' recovery noted on log			
-		1.5	SS-11	0-1-1	50.0-51.5' - Same as 45.0-46.5' except l	imestone -					
-		1.5	33-11	(2)	fragments in top 1" of sample, rock frag fossiliferous, no HCL reaction, trace coa			-			
_	51.5				sand-sized concretions	ırse /	Ш	_			
					Came allow						
_						_	1				
-						-	l	-			
-						-	l	-			
-						-		-			
1 -						_		_			
55	55.0						L				
-11.8					Silty Sand (SM)	10)(5 = ( :: )	Ш	1			
1 -		1.3	SS-12	0-1-5	55.0-56.3' - moderate yellowish brown, ( wet, loose, very fine to fine grained, no h	10YR 5/4), -					
-	50.5			(6)	40% low plasticity fines, trace moderate	gray (N5) to		-			
-	56.5				dark reddish brown (10YR 3/4) concretion	ons or pyrite /-		] -			
-					nodules in upper 4" of sample, black (or	ganic) / _		-   -   -   -   -   -   -   -   -   -			
1 _					staining over bottom 6" of sample		1	Driller's Remark: "Drastic" change of material at 57.5', harder and different in color -			
								("gray to green")			
1 -						_	1	Driller switch to tri-cone roller bit (from drag			
1 -						-	İ	bit) at 57.5' – Driller removes large (6" spherical) piece of			
-						-	l	silty clay with trace rock fragments from drill			
-						-		bit from 57-60'			
60							<u> </u>				
1		1	1				I	l l			



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-07A	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724358.9 N, 457965.5 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" drag bit

			gs on 6/16		S/N 1860/3, mud rotary, cathead, NW rods, 3-//8" drag bit         OHIENTATION: Vertical           START: 6/15/2007         END: 6/17/2007         LOGGER: N. Jarzyniecki
				STANDARD	SOIL DESCRIPTION COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	O O O
A BE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
-16.8	60.0 60.6	0.6	SS-13	25-50/1 (75/7")	Elastic Silt (MH) 60.0-60.6' - very light gray, (N8), mottled with
-				(1311)	yellowish gray (5y 8/1), wet, hard, high plasticity, slow dilatancy, 10-15% fine sand (both silica and carbonate), pyrite nodules in top 1.5" of sample to 3/4", mild HCl reaction in carbonate materials, most of sample is non-reactive
- 65_ -21.8	65.0 65.4	0.4	SS-14	50/5 (50/5")	Clayey Sand (SC)  Clayey Sand (SC)  55.0-65.4' - light gray to yellowish gray, (N7 to 5Y 8/1),
- - - - -				1000	wet, very dense, medium to coarse grained, moderate HCl reaction in carbonate materials, subangular grains (carbonate material with trace pyrite), 5-10% fine grained silica sand, 25% medium to high plasticity fines
70	70.0				- Industrial Industrial Constant Constant With Class To
-26.8 - - - - - -	71.5	1.2	SS-15	16-17-12 (29)	Interbedded Poorly Graded Sand With Clay To Clayey Sand And Fat Clay (SP-SC, CH) 71.0-71.2' - 60% sand: yellowish gray (5Y 8/1), wet, medium dense, fine silica sand, 5-10% medium sand-sized carbonate grains in upper half of sample, variable fine (10-30%) content, medium plasticity, mild HCl reaction in carbonate grains, 40% of sample fat clay (CH): greenish gray (5G 6/1), moist, high plasticity, at 70.0-70.5' clay in 3/4" irregular beds, at 70.5-71.2' clay occurs in 1-3/16" to 2" lenses interbedded in sand
75	75.0				1
-31.8 - - -	76.5	1.5	SS-16	4-2-4 (6)	Poorly Graded Sand With Silt (SP-SM) 75.0-76.4' - yellowish gray, (5Y 7/2), wet, loose, very fine to fine grained, no HCl reaction, 5% nonplastic fines, trace black mottling at 75.2-75.3', silica sand  8:15: HW casing to 70' 8:30: At 75.0' switch to 2-7/8" rock bit 8:57 Driller's Remark: Casing slid approx. 2-
-					1/2' down borehole, added 5' HW casing (to 75')
80					
					<u> </u>



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-07A	SHEET	5	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724358.9 N, 457965.5 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" drag bit

ORIENTATION: Vertical WATER LEVELS: 4.5 ft bgs on 6/16/07 LOGGER: N. Jarzyniecki START: 6/15/2007 END: 6/17/2007 SOIL DESCRIPTION COMMENTS STANDARD Log DEPTH BELOW SURFACE AND ELEVATION (#) PENETRATION TEST RESULTS SAMPLE INTERVAL (ft) SYMBOLIC SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, RECOVERY (ft) DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY 6"-6"-6" #TYPF (N) -36.8 80.0 Silty Sand (SM) 1-0-50/5 (50/11") 80.0-80.9' - yellowish gray, (5Y 7/2), wet, very loose, 1.4 SS-17 very fine to fine grained, no HCl reaction, 20-25% nonplastic fines, silica sand 81.4 Organic Lens (OL) 80.9-81.1' - brownish black, (5YR 2/1), shiny slickensided appearance, may be compressed leaves Elastic Silt (MH) 81.1-81.4' - medium gray, (N5), moist, hard, medium plasticity, slow to rapid dilatancy, strong HCl reaction, mottled 85 85.Q -41.<del>8</del> 0.1 \ SS-18 50/1.5 Silt With Sand (ML) 0.3' recovery noted on log (50/1.5")85.0-85.1' - dusky yellow, (5Y 6/4), moist, hard, nonplastic, rapid dilatancy, strong HCl reaction, 15-20% fine to medium sand, all carbonate Driller's Remark: Clay lens at 87.5-88.0' Driller's Remark: Very soft at 88.5' 90 90.0 -46.8 1.6' recovery noted on log 90.0-91.5' - light olive gray, (5Y 5/2), wet, hard, nonplastic, slow to rapid dilatancy, strong HCl 6-9-29 1.5 SS-19 (38)reaction, 10-15% fine to medium sand-sized particles 91.5 (carbonate), carbonate silt 95 95.0 -51.<del>8</del> 50/5.5 Silty Sand And Limestone Fragments (SM) Driller's Remark: Losing circulation at 95.0' SS-20 0.3 95.5 95.0-95.3' - yellowish gray, (5Y 8/1), wet, very dense, strong HCI reaction, fine sand-sized carbonate (50/5.5")particles, 25% non to low plasticity fines, limestone fragments to 1/2" in "wafer" like pieces, 50% silty sand/50% limestone 100



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-07A	SHEET	6 OF	- 9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724358.9 N, 457965.5 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" drag bit

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" drag bit  ORIENTATION : Vertical										
WATER	LEVELS	: 4.5 ft bo	gs on 6/16	6/07	START : 6/15/2007 END : 6/17/2007 LOGGER	R : N	. Jarzyniecki			
				STANDARD	SOIL DESCRIPTION	g	COMMENTS			
AND A	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		2				
ᆲ빓틷		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT. RELATIVE DENSITY OR	) Fig	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION			
				(N)		Ś				
-56.8 -	100.0			22-33-45	Silty Sand (SM) 100.0-101.5' - yellowish gray, (5Y 7/2), light gray	111	1.6' recovery noted on log			
_		1.5	SS-21	(78)	mottling, wet, very dense, medium to coarse grained,		_			
-	101.5				strong HCl reaction, 25% low plasticity fines increasing to 35-40%, all carbonate		_			
_						1	_			
_						1	_			
_							_			
_							_			
_						1	<u>_</u>			
_						1				
105_	105.0					1				
-61. <del>8</del>		0.9	SS-22	37-50/5	Poorly Graded Sand With Silt (SP-SM) 105.0-105.1' - pale yellowish brown, (10YR 6/2), wet,	1	1.35' recovery noted on log			
_	105.9			(87/11")	very dense, strong HCl reaction in carbonates, 5-10%	111	<u> </u>			
l _					\  \nonplastic fines, fine silica sand, medium carbonate \  \  \sand, trace black medium sand-sized minerals	1	_			
l _					Silty Sand (SM)	1	_			
_					105.1-105.9' - Same as 100.0-101.5' except very strong HCl reaction, 40% low-plasticity fines	1	_			
_					strong from reaction, 40 % low-plasticity lines	]				
_										
l _						]				
l _						⅃				
110_	110.0									
-66.8				30-50-50/3	Poorly Graded Sand With Silt (SP-SM) 110.0-110.95' - Same as 105.0-105.1' except	1	Driller's Remark: Likely to have no recovery if coring begins at 105.0'			
l _	444.0	1.3	SS-23	(100/9")	yellowish gray to pale yellowish brown, (5Y 7/2 to	14	2.0' recovery noted on log			
_	111.3				10YR 6/2), predominately fine to medium silica sand, 5% white medium carbonate sand, 5-10% nonplastic	╁	<b>-</b>			
_					\  fines increasing with depth; strong HCl reaction in	1	_			
_					\fines and carbonate grains Limestone Fragments	1				
l _					110.95-111.25' - yellowish gray, (5Y 7/2), fine to	1				
l _					coarse grained, very strong HCl reaction, highly fossiliferous	1	15:12: Instruct driller to take one more spoon 115.0'-120.0' and if limestone present, begin -			
-						1	coring with NQ			
_						1				
115_	115.0					ļ.,,				
-71.8 -				25-31-32	Silty Sand With Limestone Fragments (SM) 115.0-116.2' - yellowish gray, (5Y 8/1), wet, very	111	Driller extends casing (HW) to 110.0'			
_		1.2	SS-24	(63)	dense, 15% coarse sand to fine gravel-size limestone	1	_			
_	116.5			. ,	fragments, 30% low plasticity fines, all carbonate	<u> </u>	<b>' </b>			
_						1				
-						1				
-						1	00/47/07 W + 1 + 1 + 0 0			
-						1	06/17/07: Water level at 8.0'			
-						1				
-						1	8:45: Driller clear hole with tri-cone roller bit			
120										
1	l	l	I		l	1				



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724358.9 N, 457965.5 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" drag bit

,						ary, carriedu, invv rous, 5-7/6	o arag on			ONIENTATION : Vertical
WATER	LEVELS	: 4.5 ft b	gs on 6/16	6/07	START : 6/15/2007	END: 6/17/2007	LOG	GER	: N.	Jarzyniecki
				STANDARD		SOIL DESCRIPTION			ניק	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS					SYMBOLIC LOG	
				IEST RESULTS	SOIL NAM	E, USCS GROUP SYMBOL	, COLOR,		0	DEPTH OF CASING, DRILLING RATE,
ATI		RECOVE	=RY (π)		MOISTURE	CONTENT, RELATIVE DE	NSITY OR		301	DRILLING FLUID LOSS, TESTS, AND
무류의			#TYPE	6"-6"-6"	CONSISTEN	CY, SOIL STRUCTURE, MI	NERALOGY		Μ	INSTRUMENTATION
日の日				(N)						
-76.8	120.0	0.2	SS-25	50/3.5	Silty Sand Wit	h Limestone Fragments	(SM)	Н		Resume drilling 6/16/07 at 8:57
1 7				(50/3.5")	\120.0-120.2 - 3	Same as 115.0-116.2'		_/		Driller setting rod for SPT at 120.0'
-								-		-
-								-		=
I _										_
-								1		-
-								-		-
-								_		Onlik and an OO OO abit and for an 405 O 405 45!
										Split spoon SS-26 driven from 125.0-125.15'
	124.5									
105		0.2	SS-26	50/2	Limestone Fra	igments				Driller's Remark: 5% return of mud from 125-
125 -81.8		0.2	00-20	(50/2")	¬ 125.0-125.15' -	<ul> <li>yellowish gray, (5Y 8/1),</li> </ul>	strong HCI	7		130'
51.5					reaction, friable			_/		Switched to NQ WL to begin rock core at
_					Begin Rock Co	oring at 125.0 ft bgs heet for the rock core log				\125.0'
					See the next St	neer for the rock core log				
-								1		-
-								-		-
-								-		-
I _										
1 7										_
-								-		-
-								-		=
130								_		
-86.8										
-								-		7
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1 7								7		
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-91.8										
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PROJECT NUMBER:

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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724358.9 N, 457965.5 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.5	ft bg	s on 6/	16/07 START : 6/15/2007 END :	6/17/20	07 LOGGER : N. Jarzyniecki	
≥O≎	(%			DISCONTINUITIES		LITHOLOGY	COMMENTS
ELO N (F	Ä, AND 3Y (%	_	ZES T	DESCRIPTION		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR SUR	SOR! ENC	ROD	FRAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	s   ₹	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-81.8	125.0	т.	ш.	125.0, 125.1' - Bedding plane (2), horizontal,	1	Limestone	Start rock coring at 125'
-			6	smooth, planar, fractures, open	+	– 125.0-129.4' - yellowish gray, (5Y	with NQ WL casing -
-				125.35, 125.5' - Fractures (2), horizontal, rough, planar, open, some rock fragments (3)	#	7/2), fine to medium grained, strong HCl reaction, very weak (R1), 10%	-
-			>10	125.85, 125.9' - Fractures (2), horizontal,	+	<ul><li>voids up to 1/16", 5% casts/cavities</li></ul>	-
-	R1-NQ			rough, undulating, open 126.0-127.9' - Fracture zone, smooth to	+	up to 3/4"x3/8", poorly fossiliferous, slightly harder (R1-R2) from	-
-	5 ft	13	>10	rough, planar, bedding plane fractures, thin (1/2") beds, open to tight	$+$ $\square$	_ 127.9 <sup>′</sup> -129.9'	-
_	88%			(1/2 ) beds, open to light	士	}-	-
_			3	128.6, 128.9, 129.0' - Fractures (3),	士	<del>}</del>	-
-			2	horizontal, rough, undulating, open	+	ł	R1: 3 minutes
120	400.0		NR	129.1, 129.2' - Fractures (2), horizontal, rough, undulating to stepped, open	+	No Recovery 129.4-130.0'	-
130 <u> </u>	130.0			130.1' - Fracture, horizontal, rough,	丰	Limestone	-
-			3	undulating, open	#	- 130.0-130.1' - Same as 125.0-129.4' 130.1-131.55' - yellowish gray	
-				130.4' - Fracture, horizontal, rough, undulating, open, associated with large	$\pm$	mottled with light gray, (5Y 7/2 and	1
-			>10	infilled cavity	+	<ul> <li>N7), moderate HCl reaction, weak to medium strong (R2 to R3), mottling</li> </ul>	
-	R2-NQ			130.9, 131.0, 131.45' - Fractures (3), horizontal, rough, undulating, open, sandy	$\top$	associated with large cavities over	-
-	5 ft 75%	19	>10	organic soil infilling at 131.45'	廿	<ul> <li>40% of surface, carbonate, fine to medium grained, 5-10% voids up to</li> </ul>	-
-	. 670		4	131.26-131.4' - Fracture zone, sandy black (possibly organic) soil infilling	$\pm$	1/8", 25% cavities (up to	1
_			4	131.6-131.85' - Fracture zone 131.9, 132.1, 132.2' - Bedding plane (3), <10	1	- 2-3/8"x1-9/16" at 130.4-130.55', 130.75-130.8'), cavities infilled with	-
-			NR	deg, rough, undulating	F	carbonate material (pale yellowish	R2: 6 minutes
135	135.0		IVIX	132.0-132.05' - Clay seam, (CH), reacts with HCl	Ħ	brown, medium grained, weak (R2), 25% voids, mild HCl reaction, poorly	1
-91.8			. 40	132.3-132.45' - Fracture zone	1	fossiliferous) 131.55-132.45' - very pale orange,	Difficult to distinguish voids
_			>10	132.45-133.0' - Fracture, vertical, smooth, undulating, open, 70% light gray staining		(10YR 8/2), fine grained, moderate	due to average worn – appearance of unit from
_			. 10	133.0-133.1' - Fractures (3), horizontal,	$\vdash$	HCl reaction, very weak (R1), thinly bedded (1/4"-1/2"), trace voids to	drilling action
_			>10	vertical, and 30 deg, rough, undulating, open 135.0-136.4', 136.6-136.8' - Bedding plane,	$\blacksquare$	3/16", no visible casts, 25%	1
	R3-NQ	18	7	horizontal, smooth, planar, fractures every	$\perp$	extremely weak (R0), irregular gray lenses	1
	5 ft 88%	10	'	1/2" over interval, open 137.05, 137.15, 137.2, 137.6, 137.8, 138.05,	$\perp$	132.45-133.75' - yellowish gray,	1
			6	138.15, 138.25, 138.35, 138.5' - Fractures (10), horizontal, smooth to rough, planar	$\perp$	mottled light gray, and very pale orange, (5Y 7/2, N7, and 10YR 8/2),	
			J			fine grained, strong HCl reaction,	
			0	138.95' - Fracture, horizontal, rough, undulating, pale yellowish brown (10YR 6/2)	茾	medium strong (R3), 5-10% voids up to 1/16" increasing with depth, trace	R3: 4 minutes
140_	140.0		NR	clay infill up to 1/4" thick, open	井	cavities up to 9/16"x3/8"  No Recovery 133.75-135.0'	
-96.8 _			0			Limestone	
_			J		$\perp$	135.0-138.95' - yellowish gray, (5Y 7/2), medium grained, strong HCl	
_			1		$\Box$	reaction, very weak to weak (R1 to	
_				141.7' - Mechanical break	口口	R2), trace voids to 1/6", trace casts/cavities to 1/4", poorly	
-	R4-NQ 5 ft	48	>10	141.9' - Fracture, horizontal, smooth, planar, open	廿	fossiliferous (with small 3/16" shell	
-	83%	.•		142.05-142.1' - Carbonate silt seam (possible	+	fragments) -	]
-			3	infill of fracture with cuttings from drilling) 142.15, 142.2, 142.3, 142.4, 142.5, 142.65,	F	}	_
_				142.7, 142.8, 142.9, 143.05' - Fractures (10),	#	1	D4. 5 milioutes
-	_		\_0_ NR	horizontal, smooth to rough, undulating, open 143.3' - Fracture, horizontal, smooth.	1	R4: 5 minutes	
145	145.0		INIX	undulating, open	$\perp$		



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724358.9 N, 457965.5 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: G. Davis; Cathead Operator: A. Turner

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 4.5	ft bg	s on 6/	116/07 START : 6/15/2007 END :	6/17/2	2007	LOGGER : N. Jarzyniecki	
>00				DISCONTINUITIES		L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	Š SYMBOLIC LOG		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
표하는	E YEN	Q D (%)	F.0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	7		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
F F 등	NG S	Oρ	SAC ER F	PLANARITY, INFILLING MATERIAL AND	. BB		AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
<u> </u>	225	ď	# #	THICKNESS, SURFACE STAINING, AND TIGHTNES	ာ် ၆		CHARACTERISTICS	
-101.8			8	143.55' - Fracture, horizontal, smooth, planar to undulating, open	┵	┨	138.95-139.4' - yellowish gray to light gray, (5Y 7/2 to 5Y 5/2), fine to	_
l _				145.1, 145.2, 145.35' - Fractures (3),	Т	Ł	medium grained, mild HCl reaction,	
			2	horizontal, smooth, undulating, open	Ъ	1	weak to medium strong (R2 to R3), 10% voids to 1/16" in size, trace	
				145.15-145.35' - Fracture, vertical, smooth, undulating, open	$\mathbf{H}$	$-\Gamma$	voids to 3/8" in size, no visible	
-	R5-NQ			145.85' - Fracture, horizontal, smooth to		1	cavities/casts	R5: 5 minutes
-	5 ft 77%	42	>10	rough, undulating 146.35' - Fracture, <10 deg, rough,		1	No Recovery 139.4-140.0' Limestone	
-	,•			undulating, open	1	十	140.0-142.05' - Same as	6/17/07 15:30: 15' HW
-			1	146.95, 147.0, 147.2, 147.4' - Fractures (4), horizontal, rough, undulating, open	口	1	138.45-139.4' except trace cavities up to 9/16"x3/8", and 20% voids up	casing removed to ensure - no lock up in boring
-				147.0-147.4' - Fracture, vertical, rough,	$\pm$		to 1/16" from 141.3-141.7'	6/18/07 8:02 Driller's
150	450.0		NR	undulating, open 147.5, 147.55, 147.65' - Fractures (3),	F	+	142.05-144.15' - yellowish gray, (5Y 7/2 to 5Y 8/1), fine to medium	Remark: Bottom of hole -
150_ -106.8	150.0			horizontal, smooth, planar to undulating,	7	╁	grained, strong HCl reaction, very	tagged to 138.5' over newer cave-in after casing
-				open	/ <b>-1</b>		weak (R1), 10% voids up to 1/16", trace casts/cavities up to 5/16"x3/16"	removal
-				\ 147.65-147.8' - Fracture zone \ 147.95, 148.7' - Fractures (2), horizontal,	-	H	at 143.5-144.4', irregular gray	-
-				rough, undulating, open	/ -	-	laminatons and thread-like mottling	-
_					-	H	in 1/16" to 3/16" thick bands at 142.0-142.4'	-
-					4	H	No Recovery 144.15-145.0'	-
_					_		Limestone 145.0-145.85' - yellowish gray, (5Y	_
_							7/2), fine to medium grained, strong	_
l _							HCl reaction, very weak (R1), trace voids to 1/8", trace casts/shell	_
l _							fragments up to 3/8"x3/16"	_
							145.85-147.05' - pale yellowish	
						Г	brown to dusky yellow, (10Y 2/2 to 5Y 6/4), medium grained, moderate HCl	
-					1	T	reaction, very weak to weak (R1 to	
-					1	F	R2), 15-20% voids to 1/16", moderately fossiliferous	
-					1	r	147.05-147.65' - yellowish gray, (5Y	_
-					1	r	7/2), fine grained, moderate HCl reaction, weak to medium strong (R2	-
-					1	r	to R3)	-
-					-	ŀ	147.65-148.35' - Same as 145.0-145.85'	-
-					+	H	No Recovery 148.5-150.0'	-
-					-	ŀ	Bottom of Boring at 150.0 ft bgs on	-
-					4	H	6/17/2007	-
-					$\dashv$	$\vdash$	-	
-					+	F		-
-					4	F		-
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-08	SHEET	1	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.9 N, 457874.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLIN	GIMETH	OD AND	EQUIPM	ENT : CIVIE 55 S/	N 316625, mud rotary,	auto hammer, AWJ rods,	3-7/8" tri-cone bit		ORIENTATION : Vertical
WATER	LEVELS	: 4.0 ft b	gs on 5/20	0/07	START : 5/20/2007	END: 5/22/2007	LOGGEF	R : M.	Faurote, N. Jarzyniecki
				STANDARD		SOIL DESCRIPTION		ניז	COMMENTS
§₽£	SAMPLE	INTERVA	L (ft)	PENETRATION				ğ	
DEPTH BELOW SURFACE AND ELEVATION (#)		RECOVE	, ,	TEST RESULTS	SOIL NAME,	USCS GROUP SYMBOL,	COLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
A F E E		INLCOVE				CONTENT, RELATIVE DEN		BO	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
989			#TYPE	6"-6"-6" (N)	CONSISTENC	Y, SOIL STRUCTURE, MIN	NERALOGY	≥	INSTRUMENTATION
42.4	0.0			(14)	Poorly Graded S	Sand With Organics (SP	)	97	
'	0.0			1-1-1	0.0-0.9' - dark gra	ay, (N2), dry to moist, ve	ry loose, -		-
l -		0.9	SS-1	(2)	angular to sub ar	ngular, fine silica sand, 2	.5-30% _		<u>_</u>
	1.5			, ,		6 roots and rootlets that a	are 1"-1.5"		
					long and up to 3/	16 X3/16 With organics		1	08:10 Driller's Remark: 50 lb bags of
-							-	1	Halliburton Quik gel bentonite mud mixture -
-							-	┨	-
_							-	4	-
_							_	1	_
							-	1	Water level assumed at approximately 4.0'
5	5.0						-	1	below ground surface -
37.4	5.0				Silty Sand (SM)		<del></del>		_
-		, ,	00.0	4-3-4	5.0-6.0' - yellowis	sh gray, (5YR 7/2), wet, I	oose, fine	111	-
-		1.0	SS-2	(7)		a sands, 12% nonplastic		Ш	-
l _	6.5				with rootlets (<1/8	5YR 2/1), a few very larg 8" x 1/8")	je roots (>5"), /	1	_
					(With Footicis ( 177)	0 X 110 )			
_							<del>-</del>	1	_
-							-	1	-
-							-	┨	-
_							-	1	-
_							-	1	_
10	10.0						-	1	_
32.4	10.0				Silt (ML)			ш	
-		1.0	SS-3	20-34-50/5		erate yellow, (5YR 7/6), v		┨║║	-
-		1.0		(84/11")	nonplastic, rapid	dilatancy, moderate HCl edium sand-sized carbon	I reaction,	₩	_
-	11.4					ck fine sand-sized, trace		4	
_					carbonate grains				Driller's Remark: 100% circulation loss after pulling out spoon –
							_		09:30: Install 10' 6" casing, additional 5' of 6"
-							-	1	casing installed
-							-	1	11:00: 15' 6" casing installed to 14.0' below
-							-	1	ground surface (1 foot stick up height), -
-							-	1	drilling and doing SPTs with a NW casing sized stabilizer installed on AWJ rods just
-							-	1	above drill bit
15	15.0	<u> </u>	<u> </u>					L	_
27.4						Limestone Fragments (			13:53: Switched to 5 1/2" tricone bit, 100%
-		1.2	SS-4	31-24-17		yish yellow, (5Y 8/4), wel d, moderate HCl reaction		1	circulation loss after pulling out spoon, add - 1/2 bag bentonite -
-	40.5			(41)		ial, 25% nonplastic fines			172 bag benterine
-	16.5		-		fossiliferous lime	stone casts (<1/16") lime	estone, /-	1	-
-						ized fragments, limeston		1	-
_					(5G 6/6) material	ds partially infilled with b	ınınanı green	1	
					lio o o o o matorial	.,			
I -							-	1	
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-08	SHEET	2	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.9 N, 457874.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLIN	G METH	OD AND	<u>EQUIPM</u>	ENT : CME 55 S/I	/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTA	TION : Vertical
WATER	LEVELS	: 4.0 ft bo	gs on 5/20	0/07	START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki	
				STANDARD	SOIL DESCRIPTION COMMENTS	
중위원	SAMPI F	INTERVA	J (ft)	PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILL DRILLING FLUID LOSS, T INSTRUMENTATION	
ON EEL	O, avii EE			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	LING RATE,
DEPTH BELOW SURFACE AND ELEVATION (ft)		RECOVE	KY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, T	ESTS, AND
			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	ION
22.4	22.2	0.1	SS-5	(N) 50/3		willowle Demonstr
	20.8	0.1	33-3	(50/3")	Limestone Fragments 14:12: Full circulation loss, E add another 5' 6" casing sec	
				(55.5)	\recovery \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
_					1	_
-					1 1	=
-					1 1	=
_						-
_					] ] ]	_
_					] ]	_
				[	Driller's Remark: Drill bit slip	page from 23.0'-
25	25.0			[	-   24.0'	_
17.4	20.0	_		13-50/4.5	Limestone Fragments 14:47: Add 1/2 bag bentonite	e to mud vat
-	25.9	0.6	SS-6	(63/10.5")	\25.0-25.2' - Same as 15.0-16.25'	=
-	20.5			<u> </u>	Silt With Limestone Fragments (ML)	-
_					25.2-25.6' - grayish yellow, (5Y 8/4), wet, hard, rapid dilatancy, nonplastic, 10-15% medium to coarse	_
_					\sand-sized, 25% fine to coarse gravel-sized limestone \	_
					fragments, 5-10% molds 3/8"	
					1 1	_
-					1 1 1	_
-					-	_
-					-	_
_					1 4 1	_
30	30.0					<u> </u>
12.4				00.44.40	Silty Sand With Limestone Fragments (SM) 30.0-31.3' - moderate yellow, (5Y 7/6), wet, medium  15:10 Driller's Remark: No c	
		1.3	SS-7	20-11-13 (24)	dense, fine to coarse grained, moderate HCl reaction,	4 ) iristalleu –
-	31.5			(24)	22% nonplastic fines, 30-35% fine to coarse	_
-	31.3				gravel-sized limestone fragments, highly fossiliferous	-
-					\(\text{(casts/molds, shells), white-grayish yellow (5Y 8/1)}\) \(\text{and moderate yellow (5Y 7/6), all carbonate}\)	-
_					-	-
_				[	] ] ]	_
				[	]	
I ]					]	
				[	1	_
35	35.0			[	1 1	=
7.4	35.3	0.3	SS-8	50/4	Limestone Fragments	
-				(50/4")	/ \ 35.0-35.3' - moderate yellowish brown, (10YR 5/4),	_
_					fine to coarse grained, mild HCl reaction, fine	_
_					\text{gravel-sized angular fragments, 10-15% nonplastic} \text{   }	_
				[		
]				[	11	_
-				[	1 1	=
-				[		-
-				[	1 1	-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-08	SHEET	3	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.9 N, 457874.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	ATER LEVELS : 4.0 ft bgs on 5/20/07										
				STANDARD	SOIL DESCRIPTION	G	COMMENTS				
N (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME LICCO ODCUP SYMPOL COLOR	2 LO	DEDTH OF CACING SOULING DATE				
H BE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30Li	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND				
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION				
2.4	40.0	0.2	SS-9	50/5	Limestone Fragments	Ĭ	Driller's Remark: Install 4" HW casing to 40'				
-				(50/5")	40.0-40.15' - light olive gray, (5Y 5/2), wet, moderate HCl reaction, medium to coarse sand-sized, moderately fossiliferous (casts/molds), trace very fine black organics		below ground surface -				
-					Begin Rock Coring at 41.0 ft bgs See the next sheet for the rock core log		-				
-					- -	-	- -				
-					- -		- -				
45 -2.6											
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-7.6 -					-		-				
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-08	SHEET	4	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.9 N, 457874.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 4.0	ft bg:	s on 5/	20/07 START : 5/20/2007 END : 5/2	22/200	07 LOGGER : M. Faurote, N. Jarzyn	iecki
<b>≷</b> ∩≎	(%)			DISCONTINUITIES	ရွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	41.0				Ш	No Recovery 41.0-43.7'	
-	R1-NQ 5 ft	33	NR	- - - 43.3-43.9' - Fracture zone, 1"-2" fragments		- - - -	Start R1-NQ at 09:00 on 5/21/07, water level 6" SW casing at 4.9' below ground surface, 4" HW casing to 41.0', will advance 4" HW casing after pulling out R1-NQ
_	54%		>10	-	$\vdash$	_ Limestone	Driller's Remark: First 1.5' -
45			0	- -		43.7-46.0' - moderate olive brown, (5Y 4/4), wet, moderate HCl reaction, very weak (R1), highly fossiliferous	of run very fast drilling- slippage; will assume core loss occurs at top of run —
-2.6 -	46.0		2	45.6, 45.8' - Bedding plane or mechanical	Ħ	(casts/molds), 15-20% voids on - surface up to 1/16", 5-7% cavities infilled with medium gray (N5) up to	4" HW casing installed to 47.0' below ground surface R1: 4 minutes
-			NR	break (2), horizontal, rough, undulating, tight		3/8", trace black sand-sized coarse grained and short 3/4" discontinuous laminations (<1/16" thick)  No Recovery 46.0-48.3'	- - -
_	R2-NQ 5 ft	24		_	H	- Limestone	_
-	46%		5	48.95' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/2"		48.3-51.0' - Same as 43.7-46.0'	-
50				49.1, 49.4' - Bedding plane or mechanical	Ш		
-7.6 -	51.0		2	break (2), 25 deg, rough, undulating, tight 49.5, 49.6' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open	H	_	R2: 2 minutes
-			2	1/16" 49.9, 50.1' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open		51.0-55.3' - medium olive brown, (5Y - 4/4), moderate HCl reaction, weak to medium strong (R2 to R3), poorly to	_
-			1	1/8" for 49.9', tight for 50.1' 50.4, 50.5' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open		moderately fossiliferous (casts), 15-20% spheroidal voids mostly <1/1/16", trace coarse sized black	-
-	R3-NQ 5 ft 86%	72	2	1/16" 51.4' - Bedding plane or mechanical break, horizontal, rough, undulating, tight	Ħ	grains, carbonate fines/silts from 54.6-54.85', fossil casts from 1/8"-1/2"	- -
-	0070			51.75' - Fracture, 50 deg, rough, undulating, tight	Ħ		-
55_ -12.6			2	52.8' - Bedding plane or mechanical break, horizontal, rough, undulating, tight	日	- 	R3: 5 minutes
12.0	F6 0		NR	53.1' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1",very	口	- No Recovery 55.3-56.0'	- INO. O ITIIITUICES
-	56.0		0	weak rock, friable 53.3' - Mechanical break or bedding plane, horizontal, rough, undulating, tight	Ħ	Limestone 56.0-60.3' - moderate olive brown,	- -
-			0	54.6-54.85' - Fracture zone, extremely weak, carbonate silt		_ (5Y 4/4), moderate HCl reaction, medium strong rock (R3) from - 56.0-56.85', 56.8-58.5' black fine	_ _
-	R4-NQ 5 ft	45	1	56.85-58.5' - Fracture, extremely to very weak rock -		carbonate laminations, medium strong rock (R3), grading to very weak rock (R1) 58.5-60.3',	_
60	86%	.0	2	58.75' - Fracture, 50 deg, rough, undulating, ight		56.0-58.5', 5-10% voids/casts <1/16", 58.5-60.3', 30-35% voids <1/16", 3-7% medium sized black grains in rock matrix (carbonaceous)	- -
-17.6 -	0 NR			60.0, 60.2' - Mechanical break or bedding plane (2), horizontal, rough, undulating, tight		No Recovery 60.3-61.0'	R4: 3 minutes SC-1 collected at 58.75- 60.0'



PROJECT NUMBER:

33884.FL B-08 SHEET 5 OF 10

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.9 N, 457874.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 4.0	ft bg:	s on 5	/20/07 START : 5/20/2007 END : 5/	22/20	D7 LOGGER : M. Faurote, N. Jarzyn	iecki		
<b>₹</b> □₽	(%)			DISCONTINUITIES	90	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
-			0	61.2, 61.7, 63.1, 64.2, 65.4' - Fractures (5), horizontal, rough, undulating, tight		Limestone - 61.0-66.0' - light olive brown, (5Y 5/6), moderate to strong HCI	-		
-	R5-NQ 5 ft	90	1	62.75' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/4"		reaction, weak (R2), 63.0-64.0'  medium strong rock (R3), 20-25% voids/casts decreasing to 10-15% below 64.0', moderately fossiliferous (casts, few molds), trace black fine to	- - -		
65	100%		1	63.5' - Mechanical break		medium grain sized, 3-7% medium to coarse sized, medium dark gray (N4) intraclasts from 65.5-66.0', subrounded bedding interval from	-		
-22.6 -	66.0		1	64.8' - Fracture, 50 deg, rough, undulating, uight 65.75' - Bedding plane or mechanical break,		64.0-66.0', short discontinuous (3/8")  black laminations and fine grain black grained, 20% staining in olive  gray (5Y 3/2)	R5: 5 minutes		
-			3	horizontal, rough, undulating, tight 66.55' - Fracture, 35 deg, rough, undulating, open 5/8"		- 66.0-71.0' - light olive brown, (5Y 5/6), moderate HCl reaction, similar to 61.0-66.0', medium strong rock	-		
_	R6-NQ 5 ft	88	88	88	0	66.8, 66.95' - Bedding plane or mechanical break (2), horizontal, rough, undulating, tight 67.9, 68.3, 68.55, 68.7, 68.75' - Mechanical break (5)		(R3), 66.0-66.8' weak rock (R2), 68.7-69.7' extremely weak rock (R0), 10-15% voids <1/16", 5-10% medium dark gray (N4), medium to coarse	- - -
70	100%		2	69.6' - Bedding plane, 20 deg, rough,		grained intraclasts, discontinuous, 68.7-69.7' short horizontal black laminations, trace olive gray (5Y 4/1) staining	-		
-27.6 -	71.0		0	undulating, tight, very weak rock (R1) 69.9' - Fracture, 60 deg, rough, undulating, tight			R6: 7 minutes		
-			0	72.0' - Fracture, 35 deg, rough, undulating,		Limestone 71.0-75.7' - light olive brown to moderate olive brown, (5Y 5/6 to 5Y 4/4), moderate to strong HCI	SC-2 collected at 71.0-		
-	R7-NQ 5 ft	77	0	tight 72.6' - Bedding plane, horizontal, rough, undulating, tight		<ul> <li>reaction, poorly fossiliferous (casts), medium strong rock, R3, from 71.0-72.5', very weak rock, R1, to</li> <li>extremely weak rock, R0, from</li> </ul>	72.0'		
- 75	94%		0	73.95, 75.1' - Fractures (2), horizontal, rough, undulating, tight		72.5-74.2', medium strong, R3, from 74.2 to 75.7', 10-15% voids <1/16" - over 71.0-72.5', 35-40% voids <1/16" over 74.2-75.7', poorly fossiliferous	- -		
-32. <del>6</del>	76.0		1 NR			(casts), bottom 2" has gritty feel, medium dark gray (N4) intraclast as seen in 66.0-71.0' interval No Recovery 75.7-76.0'	R7: 7 minutes -		
-			NR			- No Recovery 76.0-78.0' - -	- -		
-	R8-NQ 5 ft 60%	28	>10	78.0-78.4' - Fracture zone 78.5' - Fracture or mechanical break,		-	-		
80_ -37.6			>10	horizontal, rough, undulating, open 1/16" 78.8' - Fracture, 15-20 deg, rough, undulating, open 1/6" 78.95' - Fracture or mechanical break,		- -	R8: 10 minutes		
-	81.0		0	horizontal, open 1-1/4"			_		
L					1				



PROJECT NUMBER:

33884.FL B-08 SHEET 6 OF 10

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.9 N, 457874.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 4.0	) ft bg	s on 5	/20/07 START : 5/20/2007 END : 5/	22/20	07 LOGGER : M. Faurote, N. Jarzyn	iecki
				DISCONTINUITIES	ى ق	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A A CE	L H.	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	۵	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EV.	ORE	OΩ	RAC ER F	PLANARITÝ, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	×₩Β	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
Δош	072	22	╙┺		S		
_			3	79.15' - Fracture, horizontal, rough, undulating, open 1/8"	H	Limestone - 78.0-81.0' - light olive brown, (5Y	_
_				79.25' - Fracture, horizontal, rough,	₽	5/6), strong to moderate HCl	_
_			2	undulating, tight 79.65-79.95' - Fracture zone	Ш	reaction, medium strong to strong (R3 to R4), 78.0-78.5' dissolution	
_				81.3' - Bedding plane, horizontal, rough,		cavity zone, 10-25% voids mostly	_
_	R9-NQ 5 ft	74	1	undulating, open 1/2" 81.45' - Bedding plane or mechanical break,	$\vdash$	<1/16", poorly fossiliferous (casts - <3/16") trace cavities 3/16"x1/8",	_
_	88%	7-	L'	horizontal, rough, undulating, open 1/8"		trace black fragment 3/4"x1/8",	
			1	81.9' - Bedding plane, horizontal, rough, planar		bedding discontinuity up to 5/8" at 80.7'	
85			'	82.2' - Bedding plane or mechanical break,	H	Limestone	1
-42.6			0	horizontal, rough, undulating, tight 82.9' - Fracture, 20 deg, rough, undulating,	Ш	81.0-85.4' - light olive brown to dusky yellow, (5Y 5/6 to 5Y 6/4), moderate	R9: 8 minutes
_	86.0		NR	tight		to strong HCl reaction, poorly to	1
1 -				83.45' - Fracture, 60-70 deg, rough, undulating, tight	Ъ	moderately fossiliferous (casts), 81.0-81.8' strong rock (R4), trace	1
1 -	]		1	84.4' - Fracture, 60 deg	F	voids <1/16", trace medium dark gray	1
-				86.7' - Bedding plane, horizontal, rough,		(N4) staining, 81.5-85.4' weak rock	1
-			0	undulating, tight .	╁	L (R2), 30% voids/casts <1/16", trace cavities, 10-15% medium gray (N5)	1
-	R10-NG			88.0' - Bedding plane, 5-10 deg, rough,	F	staining at 84.5'	1
-	5 ft 88%	74	>10	undulating, open 1/8" 88.2-88.5' - Fracture zone		_ No Recovery 85.4-86.0' Limestone	-
-	. 00%			88.5' - Fracture, 15-20 deg, rough to		86.0-90.4' - light olive brown to dusky	-
90			2	undulating, black staining over 15% of surface	╁	yellow, (5Y 5/6 to 5Y 6/4), moderate to strong HCl reaction, weak (R2),	SC-3 collected at 88.5-
-47.6			0	89.4' - Bedding plane, 5-10 deg, rough,	Ħ	moderate to strongly fossiliferous	89.4' R10: 9 minutes
-	01.0		NR	stepped, 1/8" black layer organics 89.7' - Bedding plane, 30 deg, rough,	t	(molds, casts), 3-7% medium coarse grain-sized black laminations <1/16"	1
-	91.0			undulating, tight	╁	thick, casts/molds up to 5/8",	1
-	-		1			voids/casts <1/16" over 25-30% of surface, 3-7% medium to coarse	-
-				91.85' - Bedding plane, 0-5 deg, smooth,	仜	sized, medium dark gray (N4)	-
-			1	undulating, tight, <1/16" fine infill		subrounded sand-sized in rock matrix, 89.9' black intraclast also at	-
-	R11-NC			92.95' - Fracture, 40 deg, rough, undulating,	╁	- 1/8" <sup>^</sup>	-
-	5 ft	60	3	tight, fracture surface parallels friable zone 1" - thick	Ħ	No Recovery 90.4-91.0' Limestone	-
-	92%			93.65, 93.7' - Fractures (2), 45 deg, rough,	Ľ	91.0-92.5' - Same as 86.0-90.4'	SC-4 collected at 92.95- 93.65'
	-		4	undulating, tight 93.8' - Fracture, 50 deg, rough, undulating,	╀	91.0-95.6' - light olive brown (5Y 5/6) grading to white (N9) at 92.5', light	
95 <u> </u>	-		<u> </u>	open 1/16"	$\vdash$	<ul> <li>Olive gray (5Y 6/1) mottling, strong</li> </ul>	R11: 16 minutes
-			2	94.0' - Fracture, 55 deg, rough, undulating,	仜	HCl reaction 92.5-95.0' - yellowish gray (5Y 8/1),	-
1 -	96.0		NR	tight 94.2' - Fracture, horizontal, rough, undulating,	$\vdash$	<ul> <li>medium strong rock (R3), cavities</li> </ul>	-
-	-		0	open 5/8", friable zone	+	fine grained infill at 92.9', very weak zones at 93.7' with a chalk-like feel,	-
-	-			94.6' - Fracture, 60 deg, rough, undulating, tight	F	<ul> <li>5-10% voids to &lt;1/16" over surface</li> </ul>	-
-			2	94.7' - Fracture, horizontal, rough, undulating,		95.0-95.25' - very weak (R1), 20-25% voids to <1/16" over surface	-
1 -	R12-NG			open 1/8" 95.1' - Bedding plane, horizontal, very weak	$\vdash$	<ul><li>95.25-95.6' - very weak (R1), with</li></ul>	-
-	5 ft	69	0	rock (white) below	F	25% (<1/16") black laminations  No Recovery 95.6-96.0'	-
-	76%			95.4' - Bedding plane, horizontal, 1/2" thick organic layer	仜		-
-			2	97.8-97.9' - Fracture zone	$\vdash$	-	-
100 -57.6				97.9' - Bedding plane, horizontal, rough, undulating —	F	_	D12: 4 minutes
-37.0			NR	99.0' - Fracture, 10-20 deg, rough,	Ľ	-	R12: 4 minutes
	101.0			undulating, open 1/2"	$\vdash$		
1							
					1		I



PROJECT NUMBER:

33884.FL B-08 SHEET 7 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.9 N, 457874.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

				IENT : CIVIE 55 3/N 5 10025, Mud Totally, NQ 10015, HW C			ORIENTATION : Vertical
WATER	LEVELS : 4.0	tt bg	s on 5		22/20 <b>I</b>		
ŞQ€	(%			DISCONTINUITIES	20	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ATICE ATICE	J.H.	(%) <sub>Q</sub>	FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	3 S	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
무유의	ORECC	Ø	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ĭ W	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ОΩШ	074	œ	╙╙		S		
_			1	99.4' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1" -	₽	<b>Limestone</b> - 96.0-99.8' - yellowish gray, (5Y 8/1),	_
			'	101.55, 102.0' - Fractures (2), 70 deg, rough,		strong HCl reaction, very weak (R1).	
				undulating, tight	Н	grading to weak rock (R2), highly	]
-			4	102.2' - Bedding plane, horizontal, rough, - undulating, tight	H	<ul> <li>fossiliferous (casts, molds), 1/2"</li> <li>fossils decreases with depth, trace</li> </ul>	1
-	R13-NQ			102.7' - Fracture, 70 deg, rough, undulating,		brownish black (5YR 2/6) infill,	_
-	5 ft	65	2	tight -	₩	- diverse fossil types over upper 2.0'	-
_	90%			102.95' - Fracture, 40 deg, rough, undulating, tight		and lower 0.5', 10-15% medium gray (N5) fine to medium sized	-
_			1	103.1' - Fracture, 60 deg, rough, undulating,	╁┌	- No Recovery 99.8-101.0'	-
105				dark gray stains over 80%, tight 103.5' - Fracture, 30 deg, rough, undulating,		Limestone	
-62.6			0	tight tight	廾	101.0-105.5' - Same as 96.0-99.8' - except yellowish gray, (5Y 7/2),	R13: 5 minutes
1 _	106.0		NR	104.7' - Fault, 40 deg, rough, undulating,	$\coprod$	strong HCl reaction, 20-25% medium	
1			0	tight, 50% dark gray staining		dark gray (N4), fine medium sized grains	
			0		Н	No Recovery 105.5-106.0'	
-				-	Ė	Limestone 106.0-111.0' - Same as 96.0-99.8'	_
_			0	-	₽	except yellowish gray, (5Y 8/1), with	-
-	R14-NQ			-	口	gradational change to smaller	-
-	5 ft	98	2	108.4' - Fracture, 60 deg, rough, undulating,		_ (mostly microforams) fossils starting at 107.5'	-
-	100%			black staining over 100% surface, tight 108.75' - Fracture, 30 deg, black staining	╁	-	-
-			1	over 100% of surface	t	-	-
110 -67.6				109.3' - Fracture, 70 deg, rough, undulating,	₽	_	D44: 5 minutes
-07.0			3	trace dark gray (N3) staining, tight 110.25' - Fracture, 70 deg, rough, undulating,	ш	<u>-</u>	R14: 5 minutes
_	111.0			dark gray stains over 100% over surface,	仜		_
l _			1	tight 110.5' - Fracture, 70 deg, rough, undulating,	┢	Limestone - 111.0-115.9' - yellowish gray, (5Y	_
			'	tight, dark gray stains over 100% of surface		8/1), fine to medium grained, strong	
				110.75' - Fracture, 70 deg, rough, undulating,	H	HCl reaction, very weak (R1),	
_			2	dark gray stains over 100% of surface, tight 111.1' - Bedding plane or mechanical break,	ш	<ul> <li>gritty/powder-like feel, highly fossiliferous (microforams, shells,</li> </ul>	SC-5 collected at 112.5-
-	R15-NQ			horizontal, rough, planar, tight, open 1/16"	T	casts, molds), grain size increases	113.3'
-	5 ft 98%	80	1	112.0' - Fracture or mechanical break, 40	╁	<ul> <li>with depth, 15-20% fine sized, medium dark gray (N4) grains in</li> </ul>	-
1 -	30 /0			deg, rough, undulating, tight 112.5' - Fracture, 60 deg, rough, undulating,	片	matrix	-
1 ,			0	open 1/16" -	╀	-	-
115_ -72.6				113.3' - Fracture or mechanical break, horizontal, rough, undulating, tight	H	_	R15: 5 minutes
-			2	115.2' - Fracture, 75-80 deg, rough, -	士	_	-
1 -	116.0		NR /	undulating, open 1/16" 115.8' - Bedding plane or mechanical break,	$\vdash$	No Recovery 115.9-116.0'	-
1 -			0	horizontal, rough, undulating, open 1/16"	Ľ	_ Limestone	_
1 -					$\vdash$	116.0-118.5' - yellowish gray, (5Y 8/1), medium grained, strong HCl	
			1	117.2' - Fracture, 70 deg, rough, undulating,	Ш	reaction, highly fossiliferous	
1			L'	tight, large casts	口	(microforams, casts, molds), 15-25%	]
1 -	R16-NQ			_	$\vdash$	moderate dark gray (N4) intraclasts, 160.4' bedding contact, fossil casts	]
1 -	5 ft 100%	100	0	-	Ľ	>3/4" (corals)	
1 -	.55,0			- 140.051. D. 11.	╨	<ul> <li>118.5-121.0' - yellowish gray, (5Y 7/2), 5/8" through coring cavities</li> </ul>	=
100			2	119.25' - Bedding plane or mechanical break, - horizontal, rough, undulating, tight, fracture	仜	infilled at 118.7', fossil casts >1/2"	-
120_ -77.6				through bioturbated zone	仜	— fragments (yellowish gray, medium	R16: 6 minutes —
1 -			0	119.6' - Bedding plane or mechanical break, - horizontal, rough, planar, tight	$\vdash$	dark gray, light olive brown) medium sized grains	-
	121.0			nonzoniai, rougn, pianai, tigrit	F		
1					1		
1			i		1		



FRACTURES PER FOOT

NR

>10

1

2

2

4

2

3

NR

3

1

5

NR

2

3

2

>10

NR

56

RQD(%)

37

WATER LEVELS: 4.0 ft bgs on 5/20/07

CORE RUN, LENGTH, AND RECOVERY (%)

R17-NQ

5 ft

54%

R18-NO

5 ft 78%

R19-NO

5 ft

76%

R20-NQ

5 ft | 58

80%

47 3

126.0

131 0

136.0

141.0

DEPTH BELOW SURFACE AND ELEVATION (ft)

> > 130

-87.<del>6</del>

135

 $-92.\overline{6}$ 

140

-97.6

PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-08	SHEET	8	OF	10	

#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724091.9 N, 457874.5 E (NAD83)

START: 5/20/2007

**DESCRIPTION** 

DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND

THICKNESS, SURFACE STAINING, AND TIGHTNESS

123.3-123.7' - Fracture zone, subangular to

125.3' - Bedding plane, horizontal, rough,

125.4' - Bedding plane, rough, undulating,

(6), horizontal, rough, planar, open <1/16"</li>127.9-128.0' - Fracture zone, horizontal,

128.4, 129.55, 129.55' - Bedding plane or

mechanical break (3), horizontal, rough,

131.1' - Bedding plane, horizontal, rough,

undulating, open 1/8" 131.25, 131.30' - Bedding plane (2),

horizontal, rough, undulating, tight

horizontal, rough, undulating, open 1/4"

132.55' - Fracture or mechanical break,

horizontal, rough, undulating, tight 133.5, 133.6, 133.7' - Bedding plane (3),

134.05' - Bedding plane, horizontal, rough,

undulating, tight 134.1' - Bedding plane, horizontal, rough,

undulating, open 1/8" 134.2, 134.4, 134.5' - Bedding plane (3),

horizontal, rough, undulating, open 1/8"

horizontal, rough, planar, tight 137.85, 137.95' - Bedding plane or

undulating, tight

138.1' - Fracture, 70 deg 138.9' - Fracture, 15-20 deg

along fracture surfaces

mechanical break (2), horizontal, rough,

139.3' - Bedding plane, 5 deg, rough,

136.1, 137.1' - Bedding plane or mechanical break (2), 5-10 deg, rough, undulating, tight

136.3' - Bedding plane or mechanical break,

undulating 139.3-140.0' - Fracture, angular stained black

horizontal, rough, planar, open <1/16

133.3' - Bedding plane or mechanical break,

tight, fracture through/across bedding plane 126.05, 126.15, 127.45, 127.55, 127.65,

129.75' - Bedding plane or mechanical break

very weak (friable texture) rock (R1)

123.85, 124.0' - Bedding plane (2), horizontal, rough, planar, open 1/16"

undulating, open 1/16"

rough, undulating

undulating, tight

subrounded 3/4"-1 5/8" limestone fragments,

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

END: 5/22/2007

90

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

DISCONTINUITIES

ORIENTATION: Vertical LOGGER: M. Faurote, N. Jarzyniecki LITHOLOGY COMMENTS ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS No Recovery 121.0-123.3 07:40: Water level on 5/22/07 at 4.9' below ground surface in 6" SW casing Limestone 123.3-123.85' - yellowish gray, (5Y 8/1), highly fossiliferous (fragments, shells, molds, casts), friable 123.85-126.0' - strong HCl reaction, very weak (R1), highly fossiliferous R17: 5 minutes (casts, shells), 1/2"x1/2" shells, 10-15% voids <1/16", very fine to Add 7.0' of 4" HW casing, now set at 53.0' below medium grain rock texture, 7-10% ground surface yellowish gray (5Y 7/2) mottling 126.0-128.0' - Same as 123.85-126.0' Limestone 128.0-129.9' - medium grained, strong HCI reaction, very weak (R1), friable, 20-25% medium grained sized, medium dark gray (N4) grains, rounded to subrounded, grain size coarsens with depth, 128.0-128.4' R18: 5 minutes very fine grain with >1/2" casts, crystalline carbonate material in rock matrix as cavity infilling and matrix All material is carbonate; grains larger (1/2"x1/8") shells No Recovery 129.9-131.0' appear to be bedded at Limestone approximate 20°-30° dip 131.0-133.4' - yellowish gray, (5Y over 132.0-133.4' interval 8/1), very weak (R1), 30-40% voids/casts <1/16", trace cavities SC-6 collected at 131.3-132 55' 3/16"x1/16", friable, highly fossiliferous (casts, molds, shells). very fine grain sized limestone, all carbonate 133.4-134.8' - yellowish gray, (5Y 8/1), very fine to medium grained, R19: 6 minutes (grain size coarsening with depth), thin bedded, medium-sized rounded particles of different colors bedded from 133.5-134.8, carbonate materials No Recovery 134.8-136.0' SC-7 collected at 136.3-137 1'

R20: 8 minutes



PROJECT NUMBER:

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SHEET 9 OF 10

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.9 N, 457874.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

DISCONTINUITIES  DESCRIPTION  DEFIN. TYPE. ORDERATION, ROUGHNESS.  DEFIN. TYPE. ORDERATION, ROUGHNESS.  THICKNESS, SURFACE STANING, AND TIGHTNESS.  141.2" - Bedding plane or mechanical break, plane. 10 dep. rough, undulating, open 17 states. 12.6. 14.1. 14.2.2" - Bedding plane, horizontal, rough, undulating, open 18.2.3" - Bedding plane, horizontal, rough, undulating, open 18.3.2.5" - Bedding plane, horizontal, rough, undulating, open 18.3.5" - Sedding plane, horizontal, rough, undulating, open 18.3.5" - Bedding plane, horizontal, rough, undulating, open 18.3.5" - Bedding plane, horizontal, rough, undulating, open 18.3.5" - Bedding plane, horizontal, rough, undulating, open 18.5.5" - Bedding pla	WATER	LEVELS : 4.0	) ft bg	s on 5	/20/07 START : 5/20/2007 END : 5/	22/20	007	LOGGER : M. Faurote, N. Jarzyn	iecki
141.2 - Bedding plane or mechanical break, 15-20 deg, rough, undulating, open fractured 136-01-38.3 - yellowish gray, (5') and 141.6 1.419, 142.2 - Mechanical break or fracture (3), horizontal, rough, undulating, tight, fractured through irregularly shaped dissolution cavities 15's brown or black staining on fracture surface 142.8 - Bedding plane, horizontal, rough, undulating, 146.0 - 18.2 - Bedding plane, horizontal, rough, undulating, 145.9 - Bedding plane, horizontal, rough, undulating, open 17's 147.55, 147.75 - Bedding plane, horizontal, rough, undulating, open 17's 147.55, 147.75 - Bedding plane or mechanical break (2), briozontal, rough, undulating, open 17's 148.2 - Mechanical break (2), briozontal, rough, undulating, undulating, upon 148.3 - Bedding plane, horizontal, rough, undulating, undulating, open 17's 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, 148.6 - Fracture, 148.6 - Fract	≥0≎	- (%			DISCONTINUITIES	ō	L	LITHOLOGY	COMMENTS
141.2 - Bedding plane or mechanical break, 15-20 deg, rough, undulating, open fractured 136-01-38.3 - yellowish gray, (5') and 141.6 1.419, 142.2 - Mechanical break or fracture (3), horizontal, rough, undulating, tight, fractured through irregularly shaped dissolution cavities 15's brown or black staining on fracture surface 142.8 - Bedding plane, horizontal, rough, undulating, 146.0 - 18.2 - Bedding plane, horizontal, rough, undulating, 145.9 - Bedding plane, horizontal, rough, undulating, open 17's 147.55, 147.75 - Bedding plane, horizontal, rough, undulating, open 17's 147.55, 147.75 - Bedding plane or mechanical break (2), briozontal, rough, undulating, open 17's 148.2 - Mechanical break (2), briozontal, rough, undulating, undulating, upon 148.3 - Bedding plane, horizontal, rough, undulating, undulating, open 17's 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, undulating, 148.5 - Fracture, 80 deg, rough, 148.6 - Fracture, 148.6 - Fract	DEPTH BELOV SURFACE ANI ELEVATION (ft	CORE RUN, LENGTH, AND RECOVERY (%	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LO		MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	145 -102.6	R21-NC 5 ft 92% 146.0 R22-NC 5 ft 92%	60	3 2 3 1 3 NR 1 2 1 2 1	141.2' - Bedding plane or mechanical break, 15-20 deg, rough, undulating, open fractured through cavity 141.6, 141.9, 142.25' - Mechanical break or fracture (3), horizontal, rough, undulating, tight, fractured through irregularly shaped dissolution cavities, 15% brown or black staining on fracture surface 142.8' - Bedding plane, 10 deg, rough, undulating, black stains over 10% of surface, open 1/16" 143.1' - Bedding plane, 15-20 deg, brownish black stains over 85% of surface, tight 143.25' - Bedding plane, horizontal, rough, undulating, open 1/8" 143.9' - Bedding plane, horizontal, rough, stepped 144.25' - Fracture, 25 deg, rough, undulating, tight 145.35' - Bedding plane, horizontal, rough, undulating, tight 145.35' - Bedding plane, horizontal, rough, undulating, open 1/16" 145.5' - Fracture, 80 deg, rough, undulating, tight 146.1' - Bedding plane or mechanical break, horizontal, rough, undulating 148.2, 148.5' - Mechanical break (2), tight 149.9' - Bedding plane, horizontal, rough, undulating tight 149.8' - Fracture, vertical, rough, undulating, tight 149.8' - Fracture, vertical, rough, undulating, tight 150.3' - Fracture, 40-50 deg, rough, undulating, tight 150.3' - Fracture or mechanical break, horizontal, rough, undulating, tight 150.3' - Fracture or mechanical break, horizontal, rough, undulating, tight			Limestone  136.0-139.3' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, very weak (R1), very fine grain rock with medium grained beds at 136.0', 138.0-138.3', very weak (R1), highly fossiliferous (microforams, shells, casts, molds), 5-7% medium sized, medium dark gray (N4) medium sized grain, subrounded, 5-10% voids <1/16", 10% mottling in yellowish gray (5Y 7/2) powder-like texture  Limestone  139.3-140.0' - yellowish gray, (5Y 8/1), very fine grained, medium strong to strong (R3 to R4), 3-5% voids <1/16", poorly fossiliferous (casts, molds), interval has broken fragments of core with irregular shaped infilled cavities (bioturbated zones), infilling with grayish yellow (5Y 8/4), hard, brittle minerals with 30-40% voids <1/16"  No Recovery 140.0-141.0'  Limestone  141.0-145.05' - very fine grained, strong HCI reaction, medium strong to strong (R3 to R4), 5-15% voids <1/16", 15-20% horizontally aligned, irregularly shaped to elongated cavities 3/16" x 1/16", few bedding contacts with brownish black (5YR 2/1) laminations on surface, trace dissolution cavities 3/4", poorly fossiliferous (casts/molds), dense heft  145.05-145.6' - light olive brown, (5Y 5/6), strong HCI reaction, weak (R2), 3-5% moderate dark gray (N4) rounded grains, fine to medium grained, trace voids <1/18"  No Recovery 145.6-146.0'  Limestone  146.0-148.9' - yellowish gray grading to 5Y 5/6), medium grained, strong HCI reaction, very weak (R1), with gritty feel, bedded medium sized carbonate grains (yellowish gray, light olive brown, moderate yellow), particle sizes decreasing with depth, angular to subrounded, medium light gray (N6) coarse sand to fine gravel-sized grains over top 0.7'	R21: 10 minutes  R21: 10 minutes  R22: 9 minutes  R22: 9 minutes  Abandonment: approximately 250 gallons of grout mix (28-47 lb bags of Bonsal brand Portland Type 1 cement), 7 dry 47 lb bags added to top of grouting surface (35-47 lb
							ŀ		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-08	SHEET	10	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724091.9 N, 457874.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	NATER LEVELS: 4.0 ft bgs on 5/20/07 START: 5/2		/20/07 START : 5/20/2007	END : 5/2	2/200	D7 LOGGER: M. Faurote, N. Jarzyr	ilecki	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	)			DISCONTINUITIES		C	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	1
표원한	AUN H, A	(%	FRACTURES PER FOOT	DEDTIL TYPE OPIENTATION POLICIA	1500	CIC	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
PTH EVA	RE I	R Q D (%)	ACT R FC	DEPTH, TYPE, ORIENTATION, ROUGHN PLANARITY, INFILLING MATERIAL AI	ND	MBC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SS	Sää	RG	FR.	THICKNESS, SURFACE STAINING, AND TIG	SHTNESS	SY	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
							148.9-151.6' - fine to very fine	
-					1		grained, strong HCl reaction, medium strong to strong (R3 to R4),	-
-					-		fine to very fine grain texture	
-					-		<ul> <li>(decreasing with depth), 3-7% voids</li> </ul>	-
-					-		<1/16", poorly fossiliferous (casts), dense heft, moderate olive brown (5Y)	-
_					-		<ul> <li>4/4) grading to yellowish gray (5Y</li> </ul>	-
-					-		7/2) at 149.5' No Recovery 150.6-151.0'	-
_					_		- Bottom of Boring at 151.0 ft bgs on	_
							5/22/2007	_
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-09	SHEET	1	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724303.2 N, 458022.2 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLIN	<u>IG METH</u>	<u>OD AND</u>	EQUIPM	ENT : CME 55 S/	N 316625, mud rotary, auto hammer, AW	J rods, 2-7/8" tri-cone bit		ORIENTATION : Vertical
WATER	LEVELS	: 4.0 ft b	gs on 5/3	/07	START : 5/1/2007 END : 5/3/20	07 LOGGER	R : R.	Bitely, K. Coke, A. Erickson, W. Elliott
				STANDARD	SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	AL (ft)	PENETRATION			SYMBOLIC LOG	
SEL ON		RECOVI		TEST RESULTS	SOIL NAME, USCS GROUP SY		$\stackrel{\circ}{\vdash}$	DEPTH OF CASING, DRILLING RATE,
A F E		RECOVI			MOISTURE CONTENT, RELATI		BOI	DRILLING FLUID LOSS, TESTS, AND
989			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTU	RE, MINERALOGY	Σ	INSTRUMENTATION
<u>42.9</u>	0.0			(11)	Poorly Graded Sand With Organ	ice (SP)	0)	
¬Z.0	0.0			1-1-2	0.0-1.1' - dark gray to very light gra	ay, (N3 to N8), -		
_		1.1	SS-1	(3)	moist, very loose, fine grained sar	nds, trace nonplastic		
_	1.5				fines that are primarily organic, tra decreasing with depth, silica sand	ice roots,		
					decreasing with depth, sinca sand			
_	1					-		
_	1					-	1	
_						-		Wet at 3.0' below ground surface (SS-1 dry
-	-					-		but SS-2 wet)
_						-		
_	]					_	1	
5	5.0					·		
37.9					Clayey Sand (SC)			-
-	1	1.0	SS-2	3-1-2	5.0-6.0' - dark yellowish brown, (1) black mottling, moist to wet, very I	OYR 6/6), brownish		
-	1		55 2	(3)	sand, 14% medium plastic fines, 5	5% concretions up to /	<i>[[]</i>	
-	6.5				1/2" in size, silica sand		ł	
_								
_						<u>-</u>		
_	1					-		
_	-					-		
-	-					-	ł	
-	-					-	ł	
10	10.0				014 (441.)			_
32.9				5.4.6	<b>Silt (ML)</b> 10.0-10.9' - grayish yellow, (5Y 8/4	1) wet stiff -		
		0.9	SS-3	5-4-6 (10)	nonplastic, rapid dilatancy, mild to	moderate HCI _	Ш	
_	11.5			(10)	reaction, trace fine grained sand,	trace concretions,	1	
_	15				carbonate derived		1	
_	-					-	1	
-						-	ł	
_						_	-	
_	]					_		
	]							
_						_		
15 15	15.0					-	1	
27.9	13.0				Silt (ML)		Ш	Driller's Remark: Some loss circulation after
-	1	0.9	SS-4	11-2-2	15.0-15.9' - Same as 10.0-10.9' ex		$\  \ $	pulling split spoon
_	-	0.9	33-4	(4)	brown-black mottling, soft, trace fill sand, fine to coarse grained sand,	ne white grained	╨	
_	16.5				Sand, line to coarse grained sand,	carporate derived /		
_	]					_	]	
						_		
_	1					-	1	
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				1			l	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-09	SHEET	2	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724303.2 N, 458022.2 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLIN	G METH	OD AND	<u>EQUIPM</u>	ENT : CME 55 S/I	N 316625, mud rotary, auto hammer, AWJ rods, 2-7/8" tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 4.0 ft b	gs on 5/3/	/07 5	START: 5/1/2007 END: 5/3/2007 LOGGER: R. Bitely, K. Coke, A. Erickson, W. Elliott
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
BEL SE Z		RECOVE	ERY (ft)	. LOT NEGOLIG	SOIL NAME, USCS GROUP SYMBOL, COLOR,  SOIL NAME, USCS GROUP SYMBOL, COLOR,  DEPTH OF CASING, DRILLING RATE,  DEPTH OF CASING, DRILLING RATE,  DEPTH OF CASING, DRILLING RATE,
YFA(			#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR OF DRILLING FLUID LOSS, TESTS, AND CONSISTENCY, SOIL STRUCTURE, MINERALOGY INSTRUMENTATION
			#1117	(N)	8
22.9	20.0	0.1	SS-5	50/3	Well Graded Gravel (GW)  Driller's Remark: 4" HW casing advanced to
-				(50/3")	20.0-20.1' - dusky yellowish brown, (10YR 2/2), fine to coarse grained gravel-sized concretions, dark
-					yellowish orange staining, fine grained sands, also a / Driller's Remark: Circulation loss
-					single limestone fragment, silica sand
-					Last SPT of 5/1/07
-					
-					
-					
-					<b>-</b>
_					<b>.</b>
25	25.0				
17.9				05.07.40	Silty Sand With Limestone Fragments (SM) 25.0-26.2' - grayish yellow, (5Y 8/4), wet, very dense, +0.8'
		1.2	SS-6	25-37-42 (79)	moderate HCI reaction, fine to coarse grained
	26.5			(1.5)	sand-sized, 41% nonplastic fines, 15% fine grained
_					gravel-sized limestone fragments, trace white   -
-					grained sand, all carbonate derived
-					<b>1</b>
-					
-					
-					-
-					
30 <u> </u>	30.0				Silty Sand (SM)
12.9				27-31-29	30.0-31.3' - Same as 25.0-26.2' except 30-35%
_		1.3	SS-7	(60)	nonplastic fines and 10-15% fine sized limestone
_	31.5				fragments
_					<b>」</b>
					] ]
					] [
_					1
-					
-					
35	35.0				
7.9	33.0				Silty Sand With Limestone Fragments (SM)
-		1.5	SS-8	29-40-19	35.0-36.5' - Same as 25.0-26.2' except 20% sized
-		1.5	55-6	(59)	limestone fragments
-	36.5				<del>                                     </del>
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-					<b>.</b>
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724303.2 N, 458022.2 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

						ary, auto riaminer, Avvo rous, 2-7			ORIENTATION: Vertical
WATER	LEVELS	: 4.0 ft b	gs on 5/3/	07 5	START : 5/1/2007	END : 5/3/2007	LOGGEF	? : R.	Bitely, K. Coke, A. Erickson, W. Elliott
				STANDARD		SOIL DESCRIPTION		g	COMMENTS
§ \$ € €	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				5	
BEI SP		RECOVE	ERY (ft)	120.1.2002.10		ME, USCS GROUP SYMBOL, CO		Ę	DEPTH OF CASING, DRILLING RATE,
VAT V			#TYPE	6"-6"-6"		E CONTENT, RELATIVE DENSINCY, SOIL STRUCTURE, MINER		SYMBOLIC LOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (ft)			#ITPE	0 -0 -0 (N)	23.10.0121	, , , , , , , , , , , , , , , , , , , ,		SYI	
2.9	40.0			·	Sandy Silt (M	L)		Ш	
-		1.5	SS-9	20-40-46	40.0-41.5' - gr	ayish yellow, (5Y 8/4), moist to	wet, -	1	<del> </del>
-		'.5	00-3	(86)	reaction 33%	tic, rapid dilatancy, moderate I fine to medium grained sand,	all _	$\  \ $	-
I -	41.5				carbonate	into to modium gramou odna,	<u></u>	Ш	=
l -									_
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_							-	l	-
45	45.0							<b>.</b>	_
-2.1				40.00.00	Sandy Silt (M	<b>L)</b> ame as 40.0-41.5'	_	]	
		1.5	SS-10	16-22-36 (58)	45.0-40.5 - 58	aille as 40.0-41.5			
-	46.5			(30)			-	1	1
-	70.5							ш	<del>-</del>
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50	50.0						-	1	Ī
-7.1	50.0	0.0	SS-11	50/4	No Recovery	50.0-50.3'			-
-				(50/4")	•				-
-							-	l	-
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55	55.0							L.	_
-12.1	55.4	0.1	SS-12	50/5 (50/5")	Limestone Fr	agments avish vellow (5V 8/4), modern	ate HCI		
				(30/3)	reaction, fine t	rayish yellow, (5Y 8/4), moderato coarse grained sand and fir	ne sized		
					limestone frag	ments		1	]
-							-	1	1
-							-	l	-
-							-	ł	-
-							-	-	-
-							-	1	
							-		Driller's Remark: Last 2.0' were harder
60							-	1	drilling, light chatter
00_								$\vdash$	_
I								1	



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724303.2 N, 458022.2 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 4.0 ft b	gs on 5/3/	07 8	START : 5/1/2007 END : 5/3/2007	LOGGEF	R : R.	Bitely, K. Coke, A. Erickson, W. Elliott
					SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS		201.00	SYMBOLIC LOG	DEDT.   OF 0.400   0.5
4 BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, O MOISTURE CONTENT, RELATIVE DENS	OLOR, SITY OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EPT LEV			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINE	RALOGY	YME	INSTRUMENTATION
<u>-17.1</u>	60.0	0.1	SS-13	(N) 50/4	│ Limestone Fragments	Γ	0)	Last SPT sample, switching to NQ coring
-	1			(50/4")	\\ 60.0-60.1' - grayish yellow, (5Y 8/4), mild to \\ HCI reaction	o moderate / -	ł	Driller's Remark: 4" HW casing advanced to
-	1				Begin Rock Coring at 61.0 ft bgs		t	60.0'
-	1				See the next sheet for the rock core log	-	l	-
-	1					-	1	-
-	1					-	1	-
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-22.1						_		_
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PROJECT NUMBER:

33884.FL

B-09

SHEET 5 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724303.2 N, 458022.2 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

CORING	NETHOD A	ND E	JUIPIV	IENT: CME 55 S/N 316625, mud rotary, NQ tools, HW c	asıng		ORIENTATION : Vertical
WATER	LEVELS: 4.0	ft bg	s on 5	/3/07 START : 5/1/2007 END : 5/3	3/2007	LOGGER : R. Bitely, K. Coke, A.	Erickson, W. Elliott
>				DISCONTINUITIES	(1)	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
B H E	RUN H, A	(%		DEDTH TVDE ODIENTATION DOUGHNESS	LIC	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F ¥ ¥ Y	NOV I	Q D (%)	Set 1	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	/BO	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SUF	COI	RO	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	61.0					Limestone	NQ coring assembly, 60.0'
-			4	61.25, 61.55' - Bedding plane or mechanical	$\vdash \vdash$	- 61.0-64.4' - grayish yellow, (5Y 8/4),	4" HW casing installed, -
-			_	break (2), horizontal, rough, undulating, open 1/16", shell casts on fracture surface	世	mild to strong HCl reaction, very weak (R1) (top most) to medium	tape measured total depth to 61.0'
1 -			6	61.7' - Fracture, 50 deg, rough, undulating,	Щ	- strong (R3) (lower 2/3 sample), voids	14:00 Start coring, using -
l _				tight	Ш	(<1/16") over 25-30% of surface,	10.0' sections of NQ barrel
	R1-NQ	_		61.95' - Fracture, 80 deg, rough, undulating, black staining in microfractures on surface		moderately fossiliferous (casts,	1
1 -	5 ft 66%	8	3	62.1, 62.25' - Bedding plane or mechanical	╁┼	<ul> <li>molds), medium gray (N5) staining over lower 2/3 sample, fossils up to</li> </ul>	1
-	. 0070		1	break (2), horizontal, rough, undulating, 1/8"	ш	3/8" in size	l <del>1</del>
-				open	$\vdash$	- No Recovery 64.4-66.0'	-
65_			ND	62.5' - Fracture, 50 to 60 deg, rough, undulating, tight —		_	Data O malianata a
-22.1	]		NR	62.6' - Mechanical break or fracture,	$\vdash \vdash$	_	R1: 3 minutes
	66.0			horizontal, rough, undulating, tight			
				62.7' - Fracture, 50 to 60 deg, rough, undulating, tight	$\vdash \vdash \vdash$	Limestone	1
-			2	62.9' - Fracture, horizontal, rough, planar,		<ul> <li>66.0-71.0' - grayish yellow, (5Y 8/4), strong HCl reaction, voids (&lt;1/16")</li> </ul>	1
-				tight	Н	over 25-30% of surface, moderate to	1 -
-			2	63.1' - Fracture or mechanical break, horizontal, rough, undulating, open to 3/4"	Ш	<ul> <li>highly fossiliferous (casts, molds),</li> </ul>	-
_				63.5, 63.75' - Fractures or mechanical break	$\vdash\vdash$	extremely weak (R0) from 66.0-66.3',	]
1	R2-NQ 5 ft	92	2	(2), horizontal, rough, undulating, dark		rest of sample medium strong rock (R3), grayish stains on rock surface	]
1	100%	32	_	grayish staining, open 1/16"	$\vdash \vdash$	(1.0), grayion stains on rock surface	SC-1 collected at 68.75-
	]			64.0' - Fracture or mechanical break, 30 deg, rough, undulating, dark grayish staining on		=	69.65'
70 -			1	surface, tight	$\vdash$	_	1
70 <u> </u>				66.1, 66.3 - Mechanical break or fractures —	世		R2: 11 minutes
			0	(2), horizontal, rough, undulating, open up to 1/2"	Н	_	-
_	71.0			67.15' - Fracture, 50 deg, rough, planar, dark			_
1 _			2	staining over 80% of surface, tight	H	71.0-75.2' - stained medium gray, - (N5), strong HCl reaction, very weak	l J
			_	67.95' - Fracture, 10 to 20 deg, smooth, stepped, tight		to weak (R1 to R2)	]
	]			68.5' - Mechanical break, 10 to 20 deg,	Щ	71.0-71.65' - voids (<5/8") over	] 1
-			0	rough, undulating, mechanical break to get	Ш	- 5-10% of surface, hard medium dark	1
-	R3-NQ			into box, tight	$\vdash \vdash$	gray (N4) mineralization and olive gray (5Y 4/1) soft plastic very fine	-
I -	5 ft	75	0	68.75, 68.85' - Mechanical break or bedding plane (2), 10 to 20 deg, rough, undulating,	世	<ul> <li>grained infilling</li> </ul>	-
I -	84%			open 1/16"	Ш	71.65-75.2' - yellowish gray, (5Y 8/1),	
				69.65' - Mechanical break or bedding plane,	$\vdash$	chalk-like texture, highly fossiliferous (shell fragments, casts, molds), most	Driller's Remark: Slight
75			1	horizontal, rough, undulating 71.1' - Bedding plane or mechanical break,		fossils <1/16" in size up to 3/8" casts	(20%) loss of circulation – over first foot of run
-32.1	1			horizontal, rough, undulating, open up to 1/4"	╁┤	73.0-73.8' - moderate yellowish	R3: 7 minutes
-			NR	71.65' - Bedding plane, horizontal, rough,	Ш	brown staining, (10YR 5/4),	-
-	76.0			undulating, open to 1/2" contact between 2	+	horizontally oriented medium dark gray (N4) 3/8" long fossils	-
-			2	colors, infilled voids and soft plastic fines on surface above		74.3-75.2' - moderate yellowish	-
	]			74.85' - Mechanical break or bedding plane,	$\vdash \vdash \vdash$	brown (10yr 5/4) staining, horizontally	Driller's Remark: Loss of
				horizontal, rough, undulating, tight		oriented medium dark gray (N4) 3/8" long fossils	core interval from 76.65- 78.5'
	]		NR	76.2' - Mechanical break or fracture, horizontal, rough, planar, open 1/16"	$\vdash \vdash$	No Recovery 75.2-76.0'	70.0
-	R4-NQ			76.4' - Fracture or mechanical break, 30 deg,		Limestone	Driller's Remark: Loss of
-	5 ft	43	4	rough, undulating	Н	<ul><li>76.0-76.65' - yellowish gray, (5Y 8/1), very fine grained, strong HCl</li></ul>	circulation at approximately -
-	62%		1	76.65' - Fracture, horizontal, rough, undulating	Ш	reaction, very weak (R1), voids	78' (100%)
-			3	78.5' - Fracture, horizontal, rough, undulating	$\vdash$	_ (<1/16") over 5-10% of surface	] _
80_			Ľ	79.0. 79.25' - Fractures (2), horizontal, rough,		No Recovery 76.65-78.55'	SC-2 collected at 79.8-
-37.1				undulating, top and base of crumbled rock	Щ		81.0'
I -	910		0	fragments, tight	Ш	-	R4: 25 minutes
-	81.0					-	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-09	SHEET	6	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724303.2 N, 458022.2 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.0	ft bg	s on 5/	3/07 START : 5/1/2007 END : 5/3	3/200	LOGGER : R. Bitely, K. Coke, A.	Erickson, W. Elliott
<0.≘	(%			DISCONTINUITIES	ဉ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
8542.1 -	R5-NQ 5 ft 100% 86.0 R6-NQ 5 ft 100%	86	1 2 3 0 1 2 1 0	THICKNESS, SURFACE STAINING, AND TIGHTNESS  79.8' - Bedding plane or mechanical break, horizontal, rough, planar, open <1/16" 81.5' - Mechanical break, 50 to 60 deg, rough, undulating, tight 81.8' - Bedding plane or mechanical break, horizontal, rough, undulating, tight 82.8, 82.9, 83.05' - Bedding plane or mechanical break (3), 30 deg, rough, undulating, tight, fossil casts (up to 1 1/2" size) and molds (of tubular fossils) on surfaces 83.3' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1" 83.5' - Mechanical break, mechanical break to get into box 83.7' - Bedding plane or mechanical break, horizontal, rough, undulating, slight darker discoloration/staining 84.2' - Mechanical break, 10 deg, rough, undulating, tight 85.4' - Bedding plane, 0 to 5 deg, rough, undulating, soft fine material infill 1/16" thick 86.2, 86.7' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open	AS	Limestone  78.55-81.0' - medium yellow, (5Y 7/6), very fine grained, strong HCl reaction, weak to strong (R2 to R4), voids (<1/16") over 25-30% of surface, trace unfilled cavities, irregularly shaped, poorly fossiliferous (casts) 81.0-85.4' - yellowish gray, (5Y 8/1), white mottled, strong HCl reaction, very weak to weak (R1 to R2), highly fossiliferous (molds, casts) 1" long tubular molds 1/16" diameter, voids (<1/16") over 30-35% of surface, 83.3-84.0' very fine grained  "chalk-like" textured layer, below 84.0' highly mottled in bioturbated pockets 85.4-86.0' - olive gray, (5Y 4/1), laminations 1/4" thick of a very fine grained soft fine material 86.0-91.0' - yellowish gray, (5Y 8/1), very fine grained, strong to moderate HCl reaction, weak (R2)	R5: 14 minutes
90 -47.1	91.0		1 2	1/8" 87.2' - Mechanical break or bedding plane, horizontal, smooth, planar 87.4' - Fracture, vertical, rough, undulating, black stains over 10-15% of surface 89.25' - Bedding plane, 70 deg, 3/4" thick soft		86.0-86.4' - light olive brown (5Y 5/6) bioturbated pockets with voids (<1/16") 86.4-86.7' - very fine grained "chalk-like" textured limestone bed 86.7-90.0' - very fine grained weak	R6: 21 minutes -
- - - - - 95 -52.1	R7-NQ 5 ft 98%	82	3 0 0	fine infill (olive gray 5Y 3/2) 90.0' - Fracture, 70 deg, rough, undulating, light gray staining over 100% of surface, tight 90.45' - Fracture, 30 deg, rough, undulating, tight 91.1, 91.5' - Mechanical break or bedding plane (2), horizontal, rough, undulating, open 1/16" 91.9' - Mechanical break or bedding plane, horizontal, rough, undulating, open up to 1/2", fossils on surface of break 92.6, 93.65' - Mechanical break (2), horizontal, rough, undulating, tight 94.4' - Mechanical break or bedding plane,		(R2) rock, voids or casts (<1/16") over 10-15% of surface, grades to highly fossiliferous medium grained textured limestone, 20-25% white fossil allochems in rock matrix with 30-35% medium gray grains 89.5' - organic clay lens, light olive brown (5Y 5/6) 90.0-91.0' - 30-40% yellowish gray (5Y 7/2) grains in matrix, organic (black) laminations with 3/8" sized grains (black in color) 91.0-95.9' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak to	Driller's Remark: Depth to water 4.0' below ground surface  Last run on 5/2/07  R7: 20 minutes
- - - - -	96.0 R8-NQ 5 ft 100%	86	3 NR/ 1 0	horizontal, rough, undulating, tight 95.25' - Mechanical break or bedding plane, horizontal, rough, planar, shell casts on fracture surface, open 1/16" 95.55' - Mechanical break or bedding plane, horizontal, rough, undulating, tight, fossil cast on surface 95.65' - Mechanical break or fracture, 30 deg, rough, undulating, open 3/8"-1/4" 96.3' - Fracture or mechanical break, 30 deg, rough, undulating, tight to open 3/4"		weak (R1 to R2)  91.0-93.2' - stained yellowish gray (5Y 7/2), highly fossiliferous (casts, molds up to 3/4"), voids/casts (<1/8)  over 20-25% of surface, 10-15% fine to medium grained sized medium dark gray (N4) grains in rock matrix  No Recovery 95.9-96.0  Limestone 96.0-101.0' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCI	First core run on 5/3/07  Water level 4.0' below ground surface at 07:49  SC-3 collected at 97.35-98.5'
100 -57.1	101.0		2	98.2' - Fracture or mechanical break, horizontal, rough, undulating, gray staining  100.25' - Mechanical break, horizontal, rough, undulating, light gray staining, tight		reaction, very weak (R1), chalk-like texture, highly fossiliferous (casts, spiral-shaped up to 5/8" and molds), voids or casts (<1/16") over 25-30% of surface, trace black grains (organics)	R8: 4 minutes



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-09

SHEET 7 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724303.2 N, 458022.2 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

				IENT : CIVIE 33 3/N 3 10023, ITIUU TOLAIY, NQ LOOIS, HW C			
WATER	LEVELS : 4.0	ft bg	s on 5		3/2007		
≥□£	(%			DISCONTINUITIES	ဗ္ဂ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - -	R9-NQ 5 ft 96%	42	1 2 >10 3	100.55' - Fracture, 50 deg, rough, undulating, tight 101.3' - Mechanical break or fracture, horizontal, rough, undulating, gray staining over 100% of surface, tight 101.65' - Fracture, 80 to 90 deg, rough, undulating, gray staining, tight 102.0' - Fracture, 10 to 15 deg, rough, undulating, 40% gray staining, tight 102.5' - Fracture, 80 deg, rough, undulating, -5' - Fracture, 80 deg, rough, undulating, -1' length, tight, casts/molds on surface		Limestone Continuing  as 3/4" long x 1/8" wide grains, rock has a medium grained appearance due to medium dark gray (N4) and yellowish gray (5Y 7/2) grains in rock matrix, microforams throughout, trace elongated cavities 9/16"x1/16" rimmed with white (N9) mineral 98.1-101.0" - stained fine to medium grained yellowish gray (5Y 7/2) 101.0-105.8" - yellowish gray, (5Y	Driller's Remark: Continued 90-95% loss of circulation
105_ -62.1 -	106.0		0 NR	104.15 <sup>T</sup> - Fracture, 5 to 10 deg, rough, undulating, tight, casts/molds on surface 104.3 <sup>T</sup> - Fracture, 80 deg, rough, undulating, light gray staining on 70-80% of surface, tight		8/1), strong HCl reaction, very weak (R1), very fine to medium grained, mixture of visible white (N9), yellowish gray (5Y 7/2) and medium	R9: 4 minutes
-	R10-NQ 5 ft	100	0 0	104.7' - Fracture or mechanical break, 30 deg, rough, undulating, open up to 1"		gray (N5) grains, voids or casts  (1/16") over 25-30% of surface, spheroidal to elongated in shape, rock has chalk-like feel, casts and molds up to 3/4" visible over upper 2.5' of sample, voids (<1/32"), white spheroidal grains predominant lower 2.5' of sample	- - - -
- 110 -67.1 -	100%   111.0		0	horizontal, rough, undulating, brown staining over 80% of surface, tight 109.2' - Mechanical break, horizontal, rough, stepped, tight		No Recovery 105.8-106.0' Limestone 106.0-111.0' - same as lower 2.5' of 101.0-105.8' except with areas of bioturbation horizontally oriented, bioturbated areas are yellowish gray (5Y 8/1) with voids (<1/16") over	R10: 4 minutes
- - - -	R11-NQ 5 ft 100%	98	1 0	110.85' - Mechanical break, 70 deg, rough, undulating, tight 111.1' - Mechanical break or fracture, horizontal, rough, planar, open 1/16" 112.4' - Fracture or mechanical break, 15 to 20 deg, rough, undulating, open 1/8"  113.55' - Mechanical break, 20 deg, rough, undulating, tight		<ul> <li>40-45% of surface, trace cavities up to 3/4", elongate in shape and partially infilled like bioturbated</li> <li>areas, sample grades with depth to a yellowish gray (5Y 8/1) below 109.25' 111.0-116.0' - yellowish gray grading</li> <li>to light gray at 114.5', (5Y 8/1 to N7), very fine grained, strong HCl reaction, very weak (R1), medium to highly fossiliferous</li> </ul>	- - - - -
115 -72.1	116.0		0	115.45' - Mechanical break		114.5-116.0' - percentage of voids, fossil casts, and cavities increases with depth, voids (1/16" to 3/16") over 15-30% of surface, 5-10% cavities	R11: 2 minutes
-	- 1		1	116.1' - Fracture or mechanical break, horizontal, rough, planar		<ul> <li>up to 9/16th rimmed with white (N4) mineral (possible mineral replacement in fossil casts), tubular and shell fossil casts up to 3/8" in size, color change also indicative of</li> </ul>	- -
-	R12-NQ 5 ft 70%	68	1 1	117.45' - Fracture or mechanical break, 20 deg, rough, undulating, tight  118.55' - Fracture, 30 deg, rough, planar, open 1/16"  119.1' - Fracture or mechanical break,		change from "chalk/powder" like feel to friable/gritty feel with depth, moderately to highly fossiliferous	SC-4 collected at 117.45- 118.55' -
120 -77.1 -	121.0		NR	horizontal, rough, undulating, tight, fossil casts on surface			R12: 2 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-09	SHEET	8	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724303.2 N, 458022.2 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

				IENT : CIVIE 55 3/N 510025, MILLIO TOTALLY, NQ 10015, MW 1			ORIENTATION . Vertical
WATER	LEVELS : 4.0	π bg	s on 5		3/200		
ŞQ€	CORE RUN, LENGTH, AND RECOVERY (%)		_	DISCONTINUITIES	<u> </u> පු	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	Ä,Ä Y,C	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A P B A T I C	J.H.	(%) Q	158	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	l S	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FF 문	SNE	οD	AC ER F	PLANARITY, INFILLING MATERIAL AND	J BB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ESE	222	ď	표표	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	
			1	101051 5 1 501	Ш	Limestone	
_			1	121.35' - Fracture, 70 deg, rough, undulating, tight	Ш	<ul> <li>116.0-119.5' - fine grained, strong</li> <li>HCl reaction, very weak to weak (R1</li> </ul>	_
_				122.05, 122.1' - Bedding plane or mechanical	$\Box$	to R2), highly fossiliferous	-
-			2	break (2), 5 to 10 deg, rough, undulating,	廾	<ul> <li>(microforams, molds/casts), grades</li> </ul>	-
_	D40 NO			black speckling as stains on 25% of surface,	Ш	in color from light gray (N7) from 116.0-118.0' to medium gray (N5)	_
_	R13-NQ 5 ft	98	1	tight 123.15, 123.4' - Mechanical break (2),	Н	- from 118.0-119.5', similar sequence	_
	98%		·	mechanical break to get in to box	Щ	to 111.0-116.0', becoming friable,	
				123.55' - Fracture, 60 to 70 deg, rough,	Н	voids and fossils increase in percentage with depth, 5-10%	
125			1	undulating, tight 124.4, 124.65' - Mechanical break, horizontal,	Ш	cavities with white (N9) and	_
-82.1				rough, undulating, broken by driller, tight	Н	translucent mineral replacement,	R13: 2 minutes
_			0	124.9' - Fracture, 80 deg, rough, undulating,	$\blacksquare$	- cavities are elongated 5/8"x3/8",	-
-	126.0		NR/	black speckled staining over 60% of surface,		translucent to clear crystal grains (calcite) (1/32"-1/16"), voids (<1/16")	-
-			>10	tight 125.05' - Mechanical break, <5 deg, rough,	Ш	over 35-45% of surface	-
				undulating, black stains, tight	Н	No Recovery 119.5-121.0'	_
				126.15-126.45' - Fracture zone, subangular and subrounded limestone fragments	$\Box$	Limestone 121.0-125.9' - yellowish gray to light	
			1	3/4"-1-1/8" in size	Н	gray, then to medium light gray at	1
_	R14-NQ		3	127.85' - Fracture or mechanical break, 60 to	Ш	125.0', (5Y 8/1 to N7 to N6), fine	<b> </b>
-	5 ft	22		70 deg, rough, undulating, tight to open 7/8"	$\pm \Pi$	<ul> <li>grained, strong HCl reaction, very weak (R1), voids/microforams casts</li> </ul>	-
_	52%			128.0' - Fracture or mechanical break, horizontal, rough, planar, tight	$\Box$	(<1/16") over 30-35% of surface.	-
_				128.5' - Fracture or mechanical break,	Н	highly fossiliferous (casts, molds,	_
130_			NR	horizontal, smooth, planar, tight	Ш	microforams), fossil casts of shells	
-87.1					Н	and spiral tubes up to 9/16", echinoderms with white (N9) mineral	R14: 3 minutes
	131.0				$\Box$	replacement 9/16" x 3/16" in size,	_
_	10110				ш	similar to 101.0-105.8'	1
-			3	131.3, 131.4' - Mechanical break or fracture	Ш	_ 124.9-125.9' - possible calcite crystals	-
-			$\vdash$	(2), horizontal, rough, undulating, open <1/8" 131.75' - Mechanical break or fault,	団	No Recovery 125.9-126.0'	-
_			1	horizontal, rough, planar, tight	$\vdash$	_ Limestone	CS-5 collected at 132.3-
_				132.3' - Fracture, 25 deg, rough, undulating,	Ш	126.0-128.6' - medium gray to - yellowish gray, (N5 to 5Y 7/2), strong	133.5'
	R15-NQ	80	0	tight	Ш	HCl reaction, very weak to weak (R1	
]	5 ft 90%	00		133.5-133.75' - Mechanical break, 0 to 10	Ш	to R2), inverse sequence of	]
				deg, rough, planar, mechanical break to get in to box, tight	$\mathbb{H}$	<ul> <li>106.0-111.0', grades from friable/gritty to powder-like at 127.5',</li> </ul>	]
125			2	134.55' - Fracture or mechanical break. 5 to	ш	highly fossiliferous (casts up to 7/8",	-
135 <u> </u>			0	10 deg, rough, undulating, tight to open 1/16" —	Ш	— molds, microforams), 3-7% 3/4"	R15: 3 minutes
-				134.6' - Fracture or mechanical break, 0 to 5	団	echinoderms (rimmed cavities with white (N9) to translucent	-
-	136.0		NR	deg, rough, planar, tight to open 1/16"	+	<ul> <li>mineralization), bottom-most 1' has</li> </ul>	-
_			1		口	3/8" thick horizontal bioturbated	]
			L <u>'</u>	136.6' - Fracture or mechanical break,	Н	lenses No Recovery 128.6-131.0'	
]				horizontal, rough, undulating, open up to 1"	Ш		]
			2	137.3' - Bedding plane, horizontal, rough, undulating, open to 5/8"	$\mathbb{H}$	_	1
-	R16-NQ	!	2	137.4' - Mechanical break or fracture, 50 deg,	口	_	-
-	5 ft	36	É	rough, undulating, tight	╂┼┤	_	
-	50%			138.1, 138.2' - Fractures (2), rough, undulating, fracture intersecting 70° fractures	Ш		
-				with 6" lengths, tight	H	_	
140_			NR	_	罝		
-97.1					$\vdash \vdash$		R16: 6 minutes
	141.0				Ш		]
					1 1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-09	SHEET	9	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724303.2 N, 458022.2 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 4.0	) ft bg:	s on 5	/3/07 START : 5/1/2007 END : 5/	3/200	D7 LOGGER: R. Bitely, K. Coke, A. Erickson, W. Elliott	
≥0.00	6)			DISCONTINUITIES	Ō	LITHOLOGY COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  RIZE AND DEPTH OF CASII FLUID LOSS, CORING RATE SMOOTHNESS, CAVING R DROPS, TEST RESULTS, E	AND OD
- - - - 145 -102.1	R17-NQ 5 ft 86% 146.0	60	2 1 3 5 0 NR	141.55' - Fracture or mechanical break, horizontal, rough, undulating, 1/2" open 141.85' - Bedding plane or mechanical break, 85 deg, smooth, undulating, open 1/16" 142.25, 143.1, 143.45, 143.8' - Fractures (4), 20 to 60 deg, rough, undulating, tight 144.2' - Fracture or mechanical break, 10 deg, rough, undulating, tight 144.55, 144.65, 144.8, 144.95' - Mechanical break or fractures (4), 0 to 10 deg, smooth, undulating, open <1/td>		Limestone  - 131.0-135.5' - yellowish gray, (5Y 8/1), medium to coarse grained, strong HCI reaction, very weak to  - weak (R1 to R2), voids (<1/16") over 10-15% of surface, chalk-like/powdery feel to sample, - 5-10% coverage of 3/4"x3/16" cavities rimmed with white (N9) mineralization, 134.75' contact (sharp) very fine grained whitish limestone below, medium gray (N6) discoloration as horizontal bands at 132.0', moderately to highly fossiliferous (casts, molds)  No Recovery 135.5 136 0'	- - - - - -
- - - - 1500 -107.1 - - - - - -	R18-NQ 5 ft 84%	78	1 1 2 0 NR	146.8' - Fracture, 50 deg, rough, undulating, tight 147.1' - Bedding plane or mechanical break, horizontal, rough, planar, tight 147.6' - Mechanical break, horizontal, rough, undulating, tight 148.25' - Mechanical break, horizontal, rough, undulating, tight 148.5' - Fracture or mechanical break, rough, undulating, 15% black speckled staining, tight 149.35-149.6' - Mechanical break or bedding plane, 5 to 10 deg, rough, undulating, open <1/108		No Recovery 135.5-136.0' Limestone  136.0-138.5' - very light gray to medium light gray, (N8 to N6), strong HCl reaction, weak to medium strong (R2 to R3)  136.0-137.25' - cavities up to 1-3/4" infilled partially and entirely with very fine grained yellowish gray (5Y 8/1) material, cavities have tubular casts 1/8" diameter, trace elongate shaped cavities 3/4"x3/16" rimmed with white (N9) mineralization (possibly echinoderms with calcite replacement) 137.25-138.5' - yellowish gray (5Y 8/1), very fine grained, moderate to strong HCl reaction, medium strong (R3), bioturbated areas with voids <1/1/6" over 30-40% of infill, poorly to moderately fossiliferous (casts, molds) No Recovery 138.5-141.0' Limestone 141.0-145.3' - yellowish gray, (5Y 8/1), medium grained, strong HCl reaction, weak to very weak (R2 to R1), possible wavy-load structures, grades from medium grained to fine grained to medium grained with	- - - - - - - - - -
						depth 141.7' - with 3-5% medium to coarse grained medium gray (N5) grains, horizontally to subhorizontally aligned, poorly fossiliferous (shells, molds, echinoderms) No Recovery 145.3-146.0'	- - - - -



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-09	SHEET	10	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724303.2 N, 458022.2 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.0	ft bg	s on 5/	3/07 START : 5/1/2007 END	: 5/3/200	LC	OGGER: R. Bitely, K. Coke, A.	Erickson, W. Elliott
<b>≩</b> Ω⊋	<u> </u>			DISCONTINUITIES	g		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNE	SYMBOLIC LOG	MINEF WEATH AI	CK TYPE, COLOR, RALOGY, TEXTURE, HERING, HARDNESS, ND ROCK MASS IARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
						7/2), strong to medium s (<1/16") ove coorly fossil some echino ntervals have grand light grantervals are n color and 20% of surfe up to 1/4" di 149.6-150.2 No Recover	P' - yellowish gray, (5Y HCI reaction, weak (R2) strong (R3) rock, voids er 10-15% of surface, liferous (casts, molds, oderms), medium grained ve barely visible distinct, yellowish gray (5Y 7/2) ay (N6), fine grained e yellowish gray (5Y 8/1) have voids (<1/16") over ace, trace infilled cavities iameter et - horizontal bedding ry 150.2-151.0' oring at 151.0 ft bgs on	
								<u> </u>



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-10

SHEET 1 OF 9

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723789.1 N, 457699.9 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

						tary, cathead, NWJ rods,				ORIENTATION : Vertical
WATER	LEVELS	: 2.0 ft b	gs on 4/7/		START : 4/6/2007	END: 4/9/2007 SOIL DESCRIPTION	LOGG	ER	: C.	Sump COMMENTS
≥⊕€				STANDARD PENETRATION	<u> </u>	SOIL DESCRIPTION		$\dashv$	90	COMMENTS
ON (	SAMPLE	INTERVA		TEST RESULTS	SOIL NAM	ME, USCS GROUP SYME	BOL. COLOR.	- 1	ICL	DEPTH OF CASING, DRILLING RATE,
H B		RECOVE			MOISTURE	E CONTENT, RELATIVE	DENSITY OR		BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTEN	NCY, SOIL STRUCTURE	, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
42.0	0.0			(* 1)	_ Topsoil			$\forall$	11/2	Cathead Operator: F. Cani
-		0.8	SS-1	2-3-5		wnish black to light bro st, root matter, wood fra		/1		Driller's Remark: Rapid, smooth drilling
-	1.5			(8)		fine silica sand	aginents, and	$/\!\!\mid\!\!\!\mid$		Water level between 1.5-3.0' below ground – surface
-	1.5					d Sand With Silt (SP)		H		Driller's Remark: Light chatter
-					very fine grain	wnish gray, (5YR 4/1), ed, silica sand, 5% nor	nplastic fines,			-
-					trace organics	<b>:</b>		1		<del>-</del>
-								1		-
-								1		-
-								1		<del>-</del>
5	5.0							1		-
37.0	0.0				Sandy Lean C			7		_
-		1.2	SS-2	4-4-3		gray, (N7), moist, med dilatancy, no HCl read		1		<del>-</del>
-	6.5			(7)	fine silica sand			7	///	-
-	0.0				1			1		
-								1		_
-								1		_
-								1		_
-								1		-
-								1		_
10	10.0							1		_
32.0	10.0				Clayey Sand (	(SC)		7		_
-		1.2	SS-3	4-22-22 (44)	10.0-10.5' - tra (N1 to 5Y 8/1).	ansitions from black to y , moist to wet, soft, high	yellowish gray, n plasticity, no to	П		_
_	11.5			(44)	¬\slow dilatancy.	, strong HCl reaction, <	5% fine to	┟╢	Щ	_
_					Silt (ML)	ed carbonate sand				_
_					10.5-11.2' - gra	ayish orange, (10YR 7/	4), dry to moist,	11		_
_					HCl reaction.	tic, rapid dilatancy, mod 10% medium sand-size	derate to strong ed. trace fine	11		_
-					gravel-sized lir	mestone fragments, all				_
					material			1		
								]		
15	15.0							$\rfloor$		
27.0				5 45 40	Silt (ML)	ame as 10.5-11.2' exce	nt coarse	J		
		1.0	SS-4	5-15-19 (34)	gravel-sized lir	mestone fragments (1"	) at top of			
_	16.5			(- )	∫interval, no sa	nd-sized material		/]		Driller's Remark: Light chatter, variable at 15-20', drill rate slowing
-										10 20 , drill rate slowing
l _										
l _										
-										
_										
20								$\perp$		



PROJECT NUMBER:

33884.FL B-10 SHEET 2 OF 9

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723789.1 N, 457699.9 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS	: 2.0 ft bo	gs on 4/7/	07 5	START : 4/6/2007 END : 4/9/2007 LOGGER : C. Sump
~				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH BE		RECOVE	<u> </u>		MOISTURE CONTENT, RELATIVE DENSITY OR  CONSISTENCY CONTENT, RELATIVE DENSITY OR  DRILLING FLUID LOSS, TESTS, AND
DEP SURI ELE\			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
22.0	<del>2</del> 0:8	0.3	SS-5	50\5.5 (50\5.5")	Silt (ML) \[ \sum 20.0-20.3' - Same as 15.0-16.0' except <5% fine \]
_				( (0010.0 )	\sand-sized material
_					
_					Driller's Remark: Slow advancement rate at
-					- 22-30', intermittent to constant heavy chatter, strong H2S odor from mud at 22-24'
-					
					] [
					] [
25 17.0	25.0				Sandy Silt With Limestone Fragments (ML)  Driller's Remark: 100% loss of circulation at
-		1.0	SS-6	23-30-30	25.0-26.0' - gravish orange. (10YR 7/4), moist to wet.
-	26.5	1.0	33-0	(60)	hard, nonplastic, rapid dilatancy, moderate to strong  HCl reaction, 25-30% fine to coarse sand-sized, weak
-	20.5				(R2) limestone lenses (<1/2" thick) throughout, all   Driller's Remark: Partial to full circulation
					return with use of thicker mud
_					
_					
-					
30	30.0				
12.0	30.0				Sandy Silt (ML)  Driller's Remark: Moderate drilling rate at 30-
		1.2	SS-7	11-24-30 (54)	30.0-31.2' - graýish orange, (10YR 7/4), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl
_	31.5			, ,	reaction, 30% very fine to fine sand-sized material, very weak (R1) limestone lens (1/2" thick) at 30.0',
-					\trace organics, all carbonate material
-					
-					<b>                                     </b>
1 [					] [
-					
35 7.0	35.0				Silty Sand (SM)
'		1.5	SS-8	9-12-5	35.0-36.5' - moderate yellowish brown, (10YR 5/4), ————————————————————————————————————
-	36.5	1.0		(17)	moderate HCl reaction, 40% nonplastic fines,
1 -	33.5				interbedded (>5) extremely weak (R0) limestone lenses (<1" thick), all carbonate material
					] [
-					
-					
-					
40					<b>1                              </b>
1	I		1		



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	B-10	SHEET	3	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723789.1 N, 457699.9 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS	: 2.0 ft bo	gs on 4/7/	07 5	START : 4/6/2007 END : 4/9/2007 LOG	GER	: C.	Sump
				STANDARD	SOIL DESCRIPTION		6	COMMENTS
AND (#)	SAMPLE	INTERVA	. ,	PENETRATION TEST RESULTS	COLL NAME LIGGS ODOLID SYMPOL COLOD		SYMBOLIC LOG	DEDTIL OF CASING DOULING DATE
H BE ATIC		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTATION
2.0	40.0	0.1	SS-9	50/4	Limestone Fragments	$\Box$	_	Driller's Remark: Light to heavy chatter at
				(50/4")	40.0-40.1' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, medium to coarse	/]		40-45', very dense, slow drilling rate
					sand-sized and fine gravel-sized fragments	┚]		
l _								_
-	-					4		-
-	-					4		-
-	<u> </u>					-		-
-	_					-		18:30 on 4/6/07 End drilling for the day at
45	45.0					-		49', water at ground surface
-3.0	70.0				Sandy Silt With Limestone Fragments (ML)		Ш	08:00 on 4/7/07 Resume drilling from 49'
		1.4	SS-10	17-29-31 (60)	45.0-46.4' - moderate yellowish brown, (10YR 5/4), moist to wet, hard, nonplastic, rapid dilatancy, mild to			Water level at 2' below ground surface -
_	46.5			()	moderate HCl reaction, 35-40% fine to coarse	/-	Ш	Driller's Remark: Moderately slow drilling rate at 45-60', intermittent light chatter
_					(<1/2" thick) interbedded throughout sample, all carbonate material	/-		-
-	-				Carbonate material	-∕ -∤		-
-	_					4		-
-						-		-
-						-		-
50	50.0					1		-
-8.0				07.00.45	Sandy Silt With Limestone Fragments (ML) 50.0-51.3' - Same as 45.0-46.4'		Ш	
_		1.3	SS-11	37-29-15 (44)	30.0-31.3 - Same as 43.0-40.4			_
-	51.5					_	Ш	-
-						-		-
-	_					-		-
-						-		-
-	-					1		-
55	55.0							
-13.0	55.4	0.4	SS-12	50/5 (50/5")	Limestone Fragments	H	H	-
-					mild HCl reaction, extremely weak (R0) limestone lenses (<1/2" thick) interbedded with silt-sized	/-		-
-	-				material, all carbonate material	╛		-
-	-					-		-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-10	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723789.1 N, 457699.9 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS	: 2.0 ft bo	gs on 4/7/	07 5	START : 4/6/2007 END : 4/9/2007 LOGGER	R : C	C. Sump
				STANDARD	SOIL DESCRIPTION	<sub>0</sub>	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR	BOLI	DRILLING FAILUD LOSS, TESTS, AND
DEPT SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYM	INSTRUMENTATION
-18.0	60.0 60.6	0.6	SS-13	22-50/0.75 (77/6.75")	Sandy Silt (ML) 60.0-60.6' - moderate yellowish brown, (10YR 5/4),	П	11:00 on 4/7/07 Set HW casing to 60.5' to begin NQ rock coring
				(1110.13)	moist, hard, nonplastic, rapid dilatancy, moderate HCI	ľ	begin No rock coming
_					reaction, 25% medium to coarse sand-sized and 5% fine to coarse gravel-sized material, all carbonate	l	-
-					\text{material, trace organic laminations} \text{ Begin Rock Coring at 61.0 ft bgs}	ł	-
-					See the next sheet for the rock core log	ł	-
-					-	ł	-
-					-	1	-
65 <u> </u>					<del></del>		
-23.0					-	ł	-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-10	SHEET	5	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723789.1 N, 457699.9 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 2.0	ft bgs	s on 4	77/07 START : 4/6/2007 END : 4/9	9/200	7 LOGGER : C. Sump	
≥∩ ∷	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(9)	JRES OT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
EPTH I URFAC LEVAT	ORE R ENGTH ECOVE	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMBOI	WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	0 H R			THICKNESS, SURFACE STAINING, AND HIGHTNESS	Ś		Design week coving at 64.01
-	61.0 R1-NQ 61.5 0.5 ft	0	NR	61.35, 61.4' - Fractures or mechanical break	H	Limestone - 61.0-61.3' - dark yellowish brown,	Begin rock coring at 61.0' R1: 1 minute
-	\_60%_/		2	(2), <10 deg, smooth, undulating, tight 61.7, 62.15' - Fractures or mechanical break	世	(10YR 4/2), fine grained, strong HCl reaction, weak (R2), 15% laminated	KT. THIIIIute
-				(2), <10 deg, smooth, undulating, open 1/4"	₽	<ul> <li>organics decreasing with depth, trace</li> </ul>	SC-1 collected from 62.2-
-			0	-		voids (<3/16") over surface, poorly fossiliferous	63.25' -
_	R2-NQ			63.25' - Mechanical break	I	- No Recovery 61.3-61.5'	_
-	5 ft	68	3	63.75' - Fracture, 30 deg, rough, undulating,		62.5-64.3' - Same as 61.0-62.5' except extremely weak to very weak	_
	100%			open 1/4" 64.0' - Mechanical break	+	<ul> <li>(R0 to R1), 10% laminated organics,</li> </ul>	_
-23.0			3	64.3' - Fracture, 20 deg, rough, undulating, open 1/4"	H	poorly fossiliferous, trace voids (3/16"), few cavities (<1/2")	
				64.45' - Fracture, vertical, rough, undulating,	Ħ	- 64.3-66.3' - Same as 61.0-62.5'	R2: 10 minutes
-	00.5		4	tight 64.55, 64.85, 65.4' - Bedding plane (3),		-	-
-	66.5			horizontal, smooth, planar, tight	$\blacksquare$	Silt And Limestone Fragments (ML) 66.3-66.5' - dark yellowish brown,	Driller's Remark: 50% _ water loss at 66.5'
-			1	65.25' - Fracture or mechanical break, 80 deg, rough, undulating, tight	₩	(10YR 4/2), moderate to strong HCI	-
-				65.6-66.3' - Fracture zone or mechanical	Ħ	- \reaction, with extremely weak (R0) limestone and trace organics	-
-			1	break, 80 deg and 85 deg, rough, undulating, some horizontal fractures, tight	Ħ	Limestone	-
-	R3-NQ			66.3' - Bedding plane, horizontal, rough, undulating, soil contact, open <1/2"	L	- 66.5-66.7' - moderate yellowish brown to dark yellowish brown,	-
-	5 ft 78%	66	1	66.7' - Bedding plane, horizontal, rough.	L	(10YR 5/4 to 10YR 4/2), very fine to	-
70	. 570			undulating, open 1/2" 67.6' - Fracture or mechanical break,	₽	<ul> <li>fine grained, extremely weak (R0), with silt, trace cavities (&lt;1/2"), poorly</li> </ul>	
-28.0			4	horizontal, rough, undulating, open 1/4"	Ħ	fossiliferous	
-			NR	68.85' - Fracture or mechanical break, horizontal, rough, undulating, open 1/4"		- 66.7-68.85' - Same as 66.5-66.7' except medium strong (R3), voids	R3: 3 minutes
-	71.5		INIX	69.5' - Fracture or mechanical break, vertical, rough, undulating, open 1/4"		(<1/16") over 60-80% of surface, moderately fossiliferous with fossil	
			7	70.25-70.40' - Fracture zone, rough,		casts (<1/2") and many cavities	
			'	undulating, open 1/2" 71.50-71.95', 71.95-72.40' - Fracture zone,	Ь	(<1/2") - 68.85-70.4' - Same as 66.5-66.7'	
_			0	vertical, rough, undulating, vertical fractures	F	except moderate HCl reaction,	]
_				intersect bedding plane fractures or mechanical breaks, open <1/2"	F	extremely weak to very weak (R0 to R1), voids (<1/16") over 30-50% of	
-	R4-NQ 5 ft	70	2	73.7, 73.75, 75.1' - Fractures or mechanical	<u> </u>	surface, trace cavities (1/2"), poorly fossiliferous	
_	97%	. •		break, rough, undulating, tight to open 1/4" 74.0, 74.5, 75.9' - Mechanical break	片	No Recovery 70.4-71.5'	_
75_ -33.0			1	——————————————————————————————————————	世	Limestone 71.5-72.45' - moderate yellowish	_
-33.0					F	brown, (10YR 5/4), very fine to fine	SC-2 collected from 75.1- 76.35'
-			0	-		grained, moderate to strong HCl reaction, weak to medium strong (R2	R4: 15 minutes
-	76.5		NR.	-	仜	to R3), voids (<3/16") over 30-40% of	-
-			1	76.65, 79.1, 79.15, 79.3, 79.55' - Bedding plane or mechanical break (5), <10 deg.	仜	surface, few cavities (<1/2"), moderately fossiliferous	-
-				rough, undulating, open <1/4"	士	72.45-73.75' - Same as 71.5-72.45' except extremely weak to very weak	-
-			0	77.3, 77.75, 78.7'	$\vdash$	(R0 to R1), voids (<3/16") over	-
-	R5-NQ			-	F	30-50% of surface, few cavities	-
-	5 ft 68%	54	3	-	Ħ	73.75-75.1' - Same as 71.5-72.45'	-
90	68%		1	-	片	except medium strong (R3), mottled with very light gray (N8), voids	-
-38.0				_	L	— (<3/16") over 30-60% of surface, trace organics, many cavities <1/8"	-
-			NR	-	世	L ace organics, many cavilles > 1/0	R5: 21 minutes
-				-			-
					1		



PROJECT NUMBER:

338884.FL

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723789.1 N, 457699.9 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

	LEVELS : 2.0	ft bgs	on 4/	7/07 START : 4/6/2007 END : 4/	9/2007	LOGGER : C. Sump	
≩ D ≨	(%			DISCONTINUITIES	] ي	LITHOLOGY	COMMENTS
ELO N (#	AND ₹ (%		ZES T	DESCRIPTION	O'C	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	81.5				Н	75.1-76.35' - Same as 73.75-75.1'	16:30 on 4/7/07 End drilling
			5	81.5-82.0' - Fracture zone, rough, undulating, angular gravel-sized (<1-1/2") fragments		<ul> <li>except very light gray, (N8), medium strong to strong (R3 to R4), voids</li> <li>(&lt;1/16") over 20% of surface, elongate cavities (&lt;2"x1") with</li> </ul>	for the day at 81.5', water level at ground surface 07:30 on 04/09/07 Resume drilling, water level at 1.0'
-	DC NO		0	82.95, 84.0' - Mechanical break (2)		secondary, dark yellowish brown (10YR 4/2) infill No Recovery 76.35-76.5'	below ground surface
-	R6-NQ 5 ft 74%	62	1	84.4' - Bedding plane or mechanical break,		Limestone 76.5-79.9' - very light gray transitioning to dark yellowish brown	
85 -43.0 _			0	rough, undulating, open 1/2"		with depth, (N8 to 10YR 5/4), very fine to fine grained, moderate to strong HCl reaction, medium strong	Driller's Remark: Core barrel locked in formation
+	86.5		NR			to strong (R3 to R4), voids (<3/16") over 10-50% of surface increasing with depth, few cavities (<1/2") with trace secondary infill, trace organic	at 85', advance NW casing from 0.0-80' R6: 20 minutes SC-3 collected from 86.5-
-			0	87.3, 89.0' - Mechanical break (2)		laminae, extremely weak rock (R0) lens (1/2" thick) at 76.65' No Recovery 79.9-81.5'	87.3'
=	R7-NQ		>10	88.05-88.4', 89.4-89.5' - Fracture zone, rough, undulating, angular gravel-sized (<2") fragments		Limestone 81.5-85.2' - moderate yellowish brown to dark yellowish brown,	
90	5 ft 68%	46	>10	88.6' - Fracture or mechanical break, rough, undulating, open <1") 89.6' - Fracture or mechanical break, rough,		(10YR 5/4 to 10YR 6/1), very fine to fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids	
-48.0			NR	undulating, tight		<ul> <li>(&lt;3/16") over 50% of surface with</li> <li>20% very fine infill, elongate cavities</li> <li>(&lt;2"x1") over 40% of surface, 80% of</li> <li>cavities with pale yellowish brown</li> </ul>	R7: 19 minutes
	91.5		\			(10YR 6/1) weak to medium strong (R1 to R3) secondary infill, poorly fossiliferous	Driller's Remark: Core loss (91.5-92.8') due to core
-			NR >10	92.8-93.1' - Fracture zone, rough, undulating,		No Recovery 85.2-86.5' Limestone 86.5-89.9' - moderate yellowish	barrel blockage
=	R8-NQ 5 ft	54	1	angular gravel-sized (<1") fragments 93.2' - Fracture or mechanical break, <10 deg, rough, undulating, tight		brown, (10YR 5/4), very fine to fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids	
95 <u> </u>	74%		0	93.85' - Fracture or mechanical break, 30 deg, rough, undulating, tight 94.0, 95.0, 95.55' - Mechanical break (3) — 95.15, 96.2, 96.25' - Fractures or mechanical		(<3/16") over 25-40% of surface, few elongate cavities (<1/2"x1/4"), transition from poor to moderately fossiliferous with depth, molds	- -
-	96.5		3	break (3), smooth to rough, undulating, tight to open <1/8"		(<1/4"), trace laminations at - 86.9-87.4", very weak (R0) lenses from 87.1-87.35' and 89.4-89.5'	R8: 33 minutes
†	50.5		>10	97.0-97.1' - Fracture zone, rough, undulating,		No Recovery 89.9-92.8' Limestone 92.8-95.6' - moderate yellowish	
			>10	angular gravel-sized (1"-1-1/2") fragments 97.45-97.65' - Fracture zone or bedding plane, rough, undulating, open <1/2"		<ul> <li>brown, (10YR 5/4), very fine to fine</li> <li>grained, mild HCl reaction, weak to</li> <li>medium strong (R2 to R3), very weak</li> </ul>	
	R9-NQ 5 ft 95%	64	5-10	98.65, 98.9' - Fracture zone or mechanical break (2), 35 deg, rough, undulating, tight to open 1/4"		(R1) from 93.6-93.9', voids (<3/16") over 40-60% of surface, few cavities (<2"x1"), light gray (N8) medium	
100_ -58.0			>10	99.15' - Fractures (2), vertical, rough, undulating, tight 99.35' - Bedding plane, rough, undulating,		strong (R3) secondary infill, moderately fossiliferous, trace organics	_
				tight			R9: 15 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-10	SHEET	7	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723789.1 N, 457699.9 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING	NE I HOD A	ND E	JUIPIV	MENT: Dietrich D-50 S/N 232, mud rotary, NQ tools, HW	casin	<u> </u>	ORIENTATION : Vertical
WATER	LEVELS : 2.0	ft bg	s on 4	/7/07 START : 4/6/2007 END : 4/	9/200	LOGGER : C. Sump	,
> O =	. (6			DISCONTINUITIES	ڻ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
				99.75-100.0' - Fracture zone, rough,	ш	95.6-96.5' - yellowish gray, (5Y 8/1),	
-	101.5		NR 1	undulating, angular gravel-sized (<2") fragments 101.65' - Bedding plane or mechanical break,	H	<ul> <li>very fine to fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), trace voids</li> </ul>	-
-			0	horizontal, rough, undulating, tight to open 1/8"		<ul> <li>(&lt;3/16"), poorly fossiliferous, few molds (&lt;1/2" diameter)</li> <li>96.5-98.2' - yellowish gray, (5Y 8/1), very fine grained, strong HCI</li> </ul>	-
-	R10-NQ 5 ft 100%	95	0	104.0, 105.2' - Mechanical break (2)		reaction, weak to medium strong (R2 to R3), extremely weak to very weak (R0-R1) from 97.0-97.5', trace voids	]
105 -63.0			0		H	(<3/16"), trace bioturbation 98.2-100.0' - Same as 96.5-98.2' except voids (<3/16") over 30-40% of	_
-	106.5		1	106.4' - Fracture, 65 deg, rough, undulating,	Ħ	surface, moderately to highly fossiliferous with molds (<1/2"), <20% organic laminations	R10: 13 minutes -
-			0	tight to open <1/4"		concentrated in extremely weak (R0) rock from 98.9-99.2' 100.0-101.25' - Same as 98.2-100.0'	]
-	R11-NQ		0	107.5, 109.0, 110.3' - Mechanical break (3)		except moderately fossiliferous, few cavities (<1") with secondary infill, trace organics  No Recovery 101.25-101.5'	]
140	5 ft 100%	100	0			Limestone 101.5-106.5' - yellowish gray, (5Y 8/1), very fine to fine grained, strong	]
-68.0 -			0			HCl reaction, very weak to weak (R1 to R2), voids (<3/16") over 20-40% of surface, few cavities (<1"x1/2") with	
-	111.5		0	111.65-113.95' - Bedding plane or fracture		<ul> <li>secondary infill, moderately to highly fossiliferous with elongate molds and casts (&lt;1x1/2"), trace organics</li> </ul>	]
_			>10	(17), <10 deg, smooth to rough, planar to undulating, tight to open <1-1/2"		106.5-111.5' - yellowish gray, (5Y 8/1), very fine to fine grained, moderate to strong HCl reaction,	]
_	R12-NQ 5 ft	68	6			<ul> <li>very weak to weak (R1 to R2), moderate yellowish brown (10YR 5/4) from 107.1-108.0', extremely</li> <li>weak (R0) from 107.75-108.3', voids</li> </ul>	SC-4 collected from 113.1- 113.9'
115	100%	00	1			(<3/16") over 30% of surface, laminated bedding from 107.1-108.0', — highly fossiliferous with elongate	]
-73.0 -			0	undulating, tight		molds, casts (<3/4x1/4") 111.5-116.5' - Same as 106.5-111.5' except strong HCl reaction, voids	R12: 11 minutes
-	116.5		>10			over 10-30% of surface, poorly fossiliferous with molds at 116.0-116.5'	-
-			>10			116.5-121.3' - Same as 111.5-116.5' except fossil molds concentrated from 120.25-121.3'	]
-	R13-NQ 5 ft 96%	64	>10	117.6-117.8' - Fracture zone, rough, undulating, angular gravel-sized (<2") fragments 118.0' - Fracture, vertical, rough, undulating,		-	-
120 -78.0	90 /0		>10	open <1"		-	-
-					Ш	-	R13: 6 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-10	SHEET	8	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723789.1 N, 457699.9 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 2.0	ft bgs	s on 4	7/07 START : 4/6/2007 END : 4/	9/200	7 LOGGER : C. Sump	
≥∩≘	(%)			DISCONTINUITIES	စ္ခ	LITHOLOGY	COMMENTS
ELOV N (#	N, AND 3Y (%	_	ZES T	DESCRIPTION	CLO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	121.5		0 NR	119.5' - Fracture, vertical, rough, undulating, open 1", length is from 119.1-119.5'		- No Recovery 121.3-121.5'	
			0	119.95-120.25' - Fracture zone, rough.	$oxed{\Box}$	Limestone	]
_				undulating, angular gravel-sized (<2") fragments	Д	121.5-126.5' - Same as 116.5-121.3' except moderately fossiliferous	
_			1		Т	overall with poorly fossiliferous interval from 124.0-125.0', secondary	-
-	R14-NQ			123.25, 124.1, 124.8' - Fractures or	ь	infill at 121.8', very fine grained from	-
-	5 ft	100	1	mechanical break (3), 60 deg, rough, undulating, tight		125.2-125.4'	-
	100%			123.9, 124.0, 124.2, 125.0' - Mechanical break (4)	$\perp$	-	-
125_ -83.0			1	bleak (4)	+	<del>-</del>	-
-				-	F	-	R14: 10 minutes
-	126.5		0		厈	-	
-	120.5		_	126.6, 128.4, 129.8, 131.25' - Fractures or	Ħ	126.5-131.45' - yellowish gray, (5Y	1
_			2	mechanical break (4), horizontal, smooth, undulating, tight	Ħ	<ul> <li>8/1), very fine to fine grained, strong</li> <li>HCl reaction, very weak to weak (R1</li> </ul>	1
_			1	undulating, tigrit	Ľ	to R2), voids over <10% of surface except from 126.5-127.6' (30%),	1
			ı		H	poorly fossiliferous, becoming	
_	R15-NQ 5 ft	93	0	_	L	yellowish gray (5Y 7/2) at - 129.0-129.65'	
_	99%				$\vdash$	<u>-</u>	_
130_ -88.0			0	_	$\vdash$	_	_
-00.0					H	_	R15: 5 minutes
-			1		$\vdash$	-	-
-	131.5		NR)		$\perp$	No Recovery 131.45-131.5'	1
-			4	131.7, 132.35, 132.45' - Mechanical break (3), horizontal, smooth, undulating, infilling	$\Box$	<ul> <li>Limestone</li> <li>131.5-136.45' - yellowish gray, (5Y</li> </ul>	-
_				132.55, 132.9, 134.4, 134.55, 134.62' -		5/1), very fine to fine grained,	1
_			0	Fractures or mechanical break (5), horizontal, smooth, undulating, tight	世	<ul> <li>moderate to strong HCl reaction, very weak to weak (R1 to R2), light</li> </ul>	SC-5 collected from 133.1-
-	R16-NQ		•	nonzontal, amount, andulating, tight		olive gray (5Y 6/1) from 132.5-132.65', extremely weak (R0)	133.9'
	5 ft 99%	87	2		$\vdash$	from 132.0-132.5', voids and cavities	]
135_			2		F	(<1/2") over <10% of surface, poorly fossiliferous with molds (1/4"),	
-93. <del>0</del>			_		厈	laminated from 132.45-132.65'	]
-			0		F	- -	R16: 6 minutes
-	136.5		NR/		Ħ	No Recovery 136.45-136.5'	-
-			>10	137.0, 137.1, 137.2, 137.25, 137.3, 137.35,	岸	Limestone	-
-				137.4, 137.45' - Bedding plane (8),	片	136.5-141.45' - yellowish gray from 136.5-138.5' and moderate yellowish	-
-			>10	horizontal, smooth, undulating, tight 137.25-137.50' - Fracture zone, rough,	片	<ul> <li>brown from 138.5-141.45', (5Y 8/1, 10YR 5/4), very fine to fine grained,</li> </ul>	-
-	R17-NQ			undulating, angular gravel-sized (<1-1/2") fragments	世	mild to strong HCl reaction, very	
-	5 ft 99%	65	1	138.0, 138.2, 138.3, 138.35, 138.45, 139.4,	世	<ul><li>weak to weak (R1 to R2), extremely weak (R0) from 138.25-138.35',</li></ul>	
140				139.65, 140.75' - Bedding plane or mechanical break (8), horizontal, smooth,	尸	poorly fossiliferous (fossils up to 1/4"x1/4"), laminated organic layers	1
-98.0			1	undulating, tight	$\mathbb{H}$	(4) at intervals 136.6-136.7',	7
					$oxed{\bot}$	131.0-137.5', 137.8-138.35', and 139.20-139.70'	R17: 6 minutes
1					1		I



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-10	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723789.1 N, 457699.9 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

				ILIVI . Dieticii D-30 3/14 232, muu rotary, 14Q tools, 1117		•	
WATER	LEVELS : 2.0	ft bgs	s on 4		9/200		
≳O₽	<u> </u>			DISCONTINUITIES	စ္က	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-	141.5		1 (NR) 1	142.1, 143.4, 144.9, 145.7' - Bedding plane		No Recovery 141.45-141.5'  Limestone 141.5-143.5' - yellowish gray to olive	-
- -	D. C. M. C.		1	or mechanical break (4), <10 deg, smooth, undulating, tight except for open 1" at 143.4'		gray, (5Y 5/1 to 5Y 6/1), very fine to fine grained, moderate HCl reaction, very weak to medium strong (R1 to R3), voids (<3/16") over 10-20% of	
- 145	R18-NQ 5 ft 94%	91	0	-		<ul> <li>surface, many elongate cavities</li> <li>(1-1/2"x1") with secondary infill,</li> <li>poorly fossiliferous, trace laminated</li> </ul>	-
145_ -103.0 -			1			bedding     143.5-146.2' - very light gray, (N8),     very fine to fine grained, moderate     HCl reaction, medium strong to	R18: 15 minutes
-	146.5		NR >10	146.5-146.9' - Fracture zone, rough, undulating, angular gravel-sized (<1-1/2")		strong (R3 to R4), voids (3/16") over 10-30% of surface , cavities (<2"x1") over 30% of surface, 60% of cavities	]
-			2	fragments 147.1, 147.25, 147.5, 148.0, 148.7, 149.8, 149.9' - Bedding plane or mechanical break (7), smooth, undulating, tight to open <1/2"		with secondary infill, poorly fossiliferous No Recovery 146.2-146.5' Limestone	-
-	R19-NQ 5 ft 73%	43	0	148.45, 149.0, 149.6' - Mechanical break (3)		<ul> <li>146.5-147.25' - light olive gray and moderate yellowish brown, (5Y 6/1, 10YR 5/4), very fine to fine grained,</li> </ul>	_
150 -108.0			2	_		<ul> <li>very weak to weak (R1 to R2), voids</li> <li>(3/16") over 20% of surface, many</li> <li>cavities (&lt;1-1/2"x1/4") over &gt;5% of</li> <li>surface, secondary infill of 50% of</li> </ul>	
-	151.5		NR	-		cavities, poorly to moderately fossiliferous 147.25-147.5' - Same as	R19: 12 minutes -
	151.5					147.25-147.5' - Same as 146.5-147.25' except voids (<3/16") over 30% of surface, trace secondary infill of cavities, few cavities <1-1/2"x1/4" 147.5-149.8' - Same as 146.5-147.25' except no to moderate HCI reaction, medium strong (R3), voids (<3/16") over 0-30% of surface increasing with depth, trace voids with secondary infill, trace laminated bedding/slump feature, trace organics, poorly to moderately fossiliferous 149.8-150.15' - Same as 147.25-147.5' No Recovery 150.15-150.5' Bottom of Boring at 151.5 ft bgs on 4/9/2007	18:00 on 4/9/07 Water level at ground surface ————————————————————————————————————



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-11	SHEET	1	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723966.3 N, 457786.7 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 299205, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 6.0 ft bo	gs on 5/20	0/07	START : 5/19/2007 END : 5/20/2007	LOGGER : J	. Burkard, C. Dellaria, B. Ellis
				STANDARD	SOIL DESCRIPTION	ن ا	COMMENTS
N AND N	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	OOU NAME LIGOO OFFILID OVARDOL OO	000	DEDTIL OF GAGING DRILLING DATE
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, CO MOISTURE CONTENT, RELATIVE DENSIT	Y OR	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINER	LOR, Y OR ALOGY	INSTRUMENTATION
42.7	0.0			(. •)	→ Poorly Graded Sand (SP)		
-	-	1.5	SS-1	3-4-5	\\ 0.0-0.2' - pale yellowish brown, (10YR 6/2), d \road material, fine silica sand	ry, loose, / -	- A
-	1.5			(9)	Topsoil		- ;
1 -					0.2-1.5' - brownish black, (5YR 2/1), dry to m 70% organic fines, 30% roots/vegetation	oist, stiff,	-
-					70 % organic intes, 00 % roots, vegetation		-
						]	
						]	
						]	
							_
5	5.0						_
37.7				0-2-4	Lean Clay (CL) 5.0-5.9' - light olive gray, (5Y 5/2), moist to w	et. firm.	<u>-</u>
-		0.9	SS-2	(6)	high plasticity, no dilatancy, 10-15% very fine	to fine	-
-	6.5				\silica sand	/ _	-
-	-					4	-
-	_					4	-
-	_						-
-							-
-						-	-
- 40	400					-	-
10 32.7	10.0				Silt (ML)	<del>-  </del>	<del>-</del>
-	-	1.0	SS-3	6-13-16	10.0-11.0' - moderate yellow, (5Y 7/6), wet, v nonplastic, rapid dilatancy, moderate HCl rea	ery stiff,	-
-	11.5			(29)	10-15% fine to medium sand-sized, all carbo	nate	-
-	11.0					1	-
-						1	-
1 -	]					1	
1						]	
						]	
] _							_
15 27.7	15.9		00.1	F0// -	- Cita Midda Linna d		
21.1		0.1	\_SS-4_/	50/1.5 (50/1.5")	Silt With Limestone Fragments (ML) 15.0-15.1' - grayish yellow, (5Y 8/4), wet, har	d, /	Driller's Remark: Lost a little circulation
-					nonplastic, rapid dilatancy, moderate HCl rea 10-15% fine to medium sand-sized, all carbo	ction,	-
-					limestone lenses 1/4" thick		-
-	-						-
-							-
-	-						-
-	-					+	-
-	1					-	-
20	-					1	-
-20_						<b>-</b>	
1						1	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-11	SHEET	2	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723966.3 N, 457786.7 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 299205, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 6.0 ft bo	gs on 5/20	0/07	START : 5/19/2007 END : 5/20/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis
300				STANDARD	SOIL DESCRIPTION © COMMENTS
AND (f	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
22.7	20.0			( )	Silty Sand (SM)
-	1	1.2	SS-5	21-24-11 (35)	20.0-21.2' - `grayish yellow, (5Y 8/4), moist to wet, dense, mild to moderate HCl reaction, fine to coarse
-	21.5			(33)	grained, 35% nonplastic fines, trace angular fine gravel-sized, all carbonate
					\(\frac{\text{graver-sized}}{2}\)
_					_
-					
-					
-					
25 <u> </u>	25.0				Silty Sand (SM)
-	-	1.0	SS-6	9-8-6	25.0-26.0' - yellowish gray, (5Y 7/2), wet, medium - dense, moderate HCl reaction, fine to coarse grained,
-	26.5			(14)	30-40% nonplastic fines, all carbonate
-	20.0				<b> </b>
					]
					] [
_					<u> </u>
-					
-					
30 <u> </u>	30.0 30.3	0.3	SS-7	50/4	Silty Sand With Limestone Fragments (SM)
- 12/	- 00.0	0.5	00-1	(50/4")	30.0-30.3' - dusky yellow, (5Y 6/4), wet, very dense,
-					mild to moderate HCl reaction, fine to coarse grained,   -   -
-	-				gravel-sized limestone, all carbonate
-	1				- 1
-					1 1
					] [
-					-
35 7.7	35.0			00 50/0	Silty Sand (SM)
'.' -	35.8	0.6	SS-8	22-50/3 (72/9")	L 35.0-35.6' - moderate yellow, (5Y 7/6), moist to wet, 🕒 □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
-					\very dense, strong HCl reaction, fine to coarse \very grained, 30% nonplastic fines, trace fine gravel, all
-	1				\carbonate -
-	1				<u> </u>
-	1				
	]				1
					] [
	1				] ]
40					



PROJECT NUMBER:	BORING NUMBER:					
338884 FI	B-11	SHEET	3	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723966.3 N, 457786.7 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 299205, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 6.0 ft bo	gs on 5/20	0/07 5	START : 5/19/2007
>00				STANDARD	SOIL DESCRIPTION g COMMENTS
N AN C	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR  ON STORY OF THE PROPERT
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
2.7	40.6	0.3	SS-9	50/3 (50/3") /	Limestone Fragments 40.0-40.3' - dusky yellow, (5Y 6/4), strong HCI
l _				(30/3)	reaction, coarse sand-sized to fine gravel-sized
-					] ]
-					<u> </u>
-					-
-					
-					<b> </b>
-					<b> </b>
45	45.0				1
-2.3	45.4	0.4	SS-10	50/5 (50/5")	Silty Sand With Limestone Fragments (SM)  45.0-45.4' - dusky yellow, (5Y 6/4), wet, very dense,
_				(30/3)	strong HCI reaction, fine to coarse grained, 15%
-					\nonplastic fines, 40% fine to coarse limestone
-					
-					-
-					-
-					<u> </u>
-					1 1
50	50.0				1 1
-7.3	50.4	0.3	SS-11	50/5 (50/5")	Limestone Fragments  Soil sampling completed at 10:55 on 5/19/07  50.0-50.3' - moderate yellowish brown, (10YR 5/4),
				(30/3)	strong HCl reaction, fine to coarse sand-sized and
_					fine to coarse gravel-sized
_					Begin Rock Coring at 51.5 ft bgs See the next sheet for the rock core log
-					
-					
-					<b> </b>
-					1 1
55					1
-12.3					
_					<b>]</b>
_					] ]
-					-
-					1 1
-					
-					1
-					1
60					1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-11	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723966.3 N, 457786.7 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

				IEINT: CIVIE 33 3/IN 299203, ITIUU TOTATY, INQ 10015, FIW C			ORIENTATION : Vertical
WATER	LEVELS : 6.0	ft bg	s on 5		20/20	· ·	
≩Q⊋	<u> </u>			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
	S F F	(%) <sub>Q</sub>	TUR 00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	٦ ĕ	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FFF	NG:	οD	RAC:	PLANARITY, INFILLING MATERIAL AND	ΜB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	CC LE PRE	ď	FF	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	Bitor 6, 1201 (1200216, 210.
	51.5			51.55-52.3' - Fracture zone, 0-15 deg, rough,	${f \perp}$	Limestone	Rock coring begins at
_			4	undulating, bedding plane fractures or	T	- 51.5-54.5' - moderate yellowish brown, (10YR 5/4), very fine to	11:25 on 5/19/07 – Driller's Remark: Soft at
-				mechanical breaks, up to 3/4" fragments 52.6-54.25' - Fracture zone, rough,	F	coarse grained, strong HCl reaction,	52.0-52.5', 53.0-53.5', 54.5-
-			>10	undulating to stepped, fine to coarse angular	╁	<ul> <li>weak (R2), 40% coverage of voids</li> </ul>	54.9'
-	D4 NO			gravel, up to 2" diameter		1/16" or less on surface, few cavities <1/2" diameter, trace secondary infill	_
_	R1-NQ 5 ft	8	>10			- recrystallization	_
_	60%	Ū					_
55						No Recovery 54.5-56.5'	
-12.3				_	$\perp$	<del></del>	
_			NR			-	R1: 3 minutes
1 -					╁	-	-
-	56.5			56.5-56.6' - Fracture zone, smooth to rough,	Ħ	Limestone	-
-			>10	undulating, fine to coarse angular gravel	₽	- 56.5-59.95' - pale yellowish brown,	-
1 -				56.9-57.55' - Fracture zone, smooth to rough,	仜	(10YR 6/2), very fine to fine grained,	_
l _			3	undulating, fine to coarse angular gravel 57.8' - Mechanical break, 30 deg, rough,	┢	strong HCl reaction, weak (R2), 40% coverage of voids 1/16" or less on	_
				undulating, tight to <1/16" open	Ė	surface, few cavities some elongate	
	R2-NQ			58.25' - Bedding plane, 10 deg, smooth,	₽	and some spherical, trace spots of	
_	5 ft 69%	20	0	undulating, <1/4" open 58.4-58.5' - Fracture zone, smooth to rough,		<ul> <li>black organic material &lt;1/2" diameter</li> </ul>	1
60			0	undulating, fine to coarse angular gravel		-	<b> </b>
-17.3				59.05' - Mechanical break —	╁	No Recovery 59.95-61.5'	<del></del>
-			NR	59.5' - Mechanical break	t	-	R2: 5 minutes
_			INK		$\perp$	-	TVZ. 5 minutes
_	61.5				口	,	_
_			1	61.7-61.8' - Fracture zone	┢	Limestone - 61.5-64.4' - moderate yellowish	_
						brown, (10YR 5/4), fine to medium	
				62.65' - Fracture, horizontal, rough, stepped	Н	grained, mild HCl reaction, weak to	
_			4	62.9' - Fracture, horizontal, smooth,	ш	<ul> <li>medium strong (R2 to R3), 0-10% coverage of voids 1/16" or less</li> </ul>	1
-	R3-NQ			undulating 63.1' - Fracture, horizontal, smooth to rough,	╁	except 20% coverage of voids up to	-
1 -	5 ft	24	3	undulating	F	- 1/8" on surface at 61.5-61.8', no	-
-	58%			63.2' - Fracture, horizontal, rough, undulating	ᡛ	visible fossils or cavities except 61.5-61.8' cavities up to 3/8"	-
65 <u> </u>				63.5-63.6' - Fracture zone 64.1' - Fracture, 28 deg, rough, stepped	$\Box$	— covering 5% of rock, trace black	_
-22.3			NR	64.4' - Mechanical break	仜	organic staining No Recovery 64.4-66.5'	DO: 5 minutes
1 -				65.0.66.1' Eractura zona	$\vdash$	- 140 Necovery 04.4-00.3	R3: 5 minutes
1	66.5			65.9-66.1' - Fracture zone	Ľ		Driller's Remark: Soft at
1 -					Н	Limestone	66.0-67.0', 68.0-68.5'
1 -			3	·	ш	- 66.5-66.95' - Same as 61.5-64.4' 66.95-67.75' - moderate yellowish	1
1 -				67.3, 67.4' - Fractures (2), <10 deg, rough, stepped	╁	brown, (10YR 5/4), fine to medium	-
1 -			4	67.6, 67.4, 67.6, 67.9' - Fractures (4), 0-18		<ul> <li>grained, mild HCl reaction, very weak</li> </ul>	-
-	R4-NQ			deg, rough, undulating	₽	(R1), 30% coverage of voids 1/16" or less on surface, trace dark organic	-
-	5 ft	37	1	69.0' - Fracture, 20 deg, smooth to rough,	F	<ul> <li>inclusions, no visible cavities or</li> </ul>	-
-	66%			undulating	口	fossils	_
70			0	_	F		
-27.3					Ľ	_	
1			NR		$\vdash$		R4: 4 minutes
1 -	71.5				ш		1
					1	-	
1					1		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-11 SHEET 5 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723966.3 N, 457786.7 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS : 6.0	ft bg	s on 5	20/07 START : 5/19/2007 END : 5/	20/200	D7 LOGGER : J. Burkard, C. Dellaria	, B. Ellis
≥∩≘	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	85-NQ 5 ft 70%	37	10 10 3 3 NR	71.5-71.8' - Fracture zone, pieces to 1" x 3" 72.0' - Bedding plane, <5 deg, smooth to rough, undulating, 1/4" open, missing faces 72.8-72.9' - Fracture zone, pieces to 1/2" diameter 73.15' - Bedding plane, horizontal, smooth, planar, tight 73.9' - Fracture, 15 deg, smooth, undulating, tight 74.25' - Bedding plane, horizontal, smooth to rough, undulating, tight to 1/4" open 74.4' - Bedding plane, rough, undulating, tight to 1/4" open	\$	Limestone  67.75-69.8' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl reaction, weak  (R2), 0-10% coverage of voids 1/16" or less except 10% coverage of 1/8" voids on surface and trace cavities to 5/16" at 68.1-68.4', no visible fossils, trace black organic staining  No Recovery 69.8-71.5'  Limestone  71.5-74.4' - moderate yellowish brown, (10YR 5/4), fine grained, mild  HCl reaction, weak (R2), 0-10%	Driller's Remark: 71-72' and 74-74.5' void R5: 6 minutes
- - - - - - - - 37.3	76.5 R6-NQ 5 ft 54%	43	10 10 0 NR	74.6' - Bedding plane, horizontal, smooth to rough, undulating, tight to 1/4" open 74.7' - Fracture, vertical, smooth, undulating, tight 74.85' - Fracture, 60 deg, smooth, undulating, tight 77.25-77.8' - Fracture zone, pieces to 2" diameter		coverage of voids 1/8", no visible fossils, no visible cavities except trace cavities up to 1 3/16" x 3/8" at 72.1-73.2', some infilled with similar material to surrounding rock except slightly darker color 74.4-75.0' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl reaction, very weak (R1), 25-35% coverage of voids 3/8" or less, 10% coverage of 9/16" x 9/16" cavities, trace dark organic inclusions, moderate to highly fossiliferous with casts to 3/16"	R6: Run time not recorded
 - - - - 85 -42.3	81.5 R7-NQ 5 ft 46%	10	2 8 1	81.5-81.6, 82.45-82.55, 82.8-82.95, 83.65-83.66' - Fracture zone, rough to smooth, undulating to stepped, fine to coarse size gravel 1-2" diameter, fragments up to 2" diameter 82.1, 83.15, 83.25, 83.45' - Bedding plane or mechanical break, 10 deg, smooth to rough, undulating to stepped, <1/2" open 82.6, 82.9' - Fractures (2), 70 deg, rough, stepped to undulating, double fracture		Limestone 76.5-77.4' - Same as 66.95-67.75' Silt (ML) 77.4-77.7' - moderate yellowish brown, (10YR 5/4), carbonate derived, overlying dark gray (N3) fat clay (CH) Limestone 77.7-79.2' - grayish orange, (10YR 7/4), fine grained, moderate HCI reaction, medium strong (R3), 0-15% coverage of voids 1/8" or less, trace cavities up to 1 3/4" x 3/4" with dark yellowish orange (10YR 6/6), infill and increased % voids, trace fossil casts to 3/16" x 3/8" in size	End of drilling for 5/19/07 Resume drilling 5/20/07 07:35 Water level is 6.0' below ground surface Driller's Remark: Soft at 82-82.5', 83-83.5', 84.5-85'
- - - 90 -47.3	R8-NQ 5 ft 80%	58	0 1 6	86.35' - Bedding plane or mechanical break, 10 deg, smooth to rough, undulating, tight to 3/4" open 86.5-86.6' - Fracture zone, with pieces to 2" diameter  88.6' - Mechanical break  89.4-89.65' - Fracture zone, 0-10 deg, smooth to rough, undulating, all bedding plane fractures, tight to 1/2"		No Recovery 79.2-81.5' Limestone 81.5-82.9' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), except for bands 3/4"-1" (lighter colored) from 81.9-82.1' and 82.5-82.8', 40% coverage of voids <1/16" on surface, few elongate cavities <3/4" diameter	SC-1 collected at 88.7- 89.55'
	91.5		NR	90.25-90.5' - Fracture zone, with pieces to 2" diameter		_	R8: 4 minutes



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-11	SHEET	6	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723966.3 N, 457786.7 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS : 6.0	ft bg	s on 5	20/07 START : 5/19/2007 END : 5/2	20/20	07 LOGGER : J. Burkard, C. Dellaria	ı, B. Ellis				
≥ ∩ ⊕	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.				
-			>10	92.1-92.9' - Fracture zone		82.9-83.8' - very pale orange, (10YR 8/2), strong HCl reaction, very strong to extremely strong (R5 to R6), very fine grained, 15% coverage of voids	-				
-			>10	92.95, 93.0, 93.2' - Fractures (3), horizontal, rough, undulating	Ħ	<ul> <li>1/16" or less on surface, few cavities, few black laminations</li> </ul>	-				
-	R9-NQ 5 ft 88%	29	7	93.3-93.8' - Fracture zone, horizontal, rough, undulating, fractures along bedding plane 94.0' - Fracture, horizontal, smooth,	Ħ	No Recovery 83.8-86.5' - Limestone 86.5-90.5' - moderate yellowish	-				
95 <u> </u>				9	undulating 94.1' - Fracture, horizontal, rough, undulating 94.5, 94.6' - Fractures (2), horizontal, smooth to rough, undulating		brown, (10YR 5/4), fine to medium grained, strong HCl reaction, weak (R2), 40% coverage of voids 1/16" or less, cavities to 3/4" diameter 5% of	R9: 5 minutes			
_	96.5		NR	94.7, 94.9, 95.0' - Fractures (3), horizontal, smooth to rough, planar		<ul> <li>rock, trace fossil casts to 1/4"</li> <li>diameter</li> </ul>	1				
			>10	95.1, 95.25, 95.3, 95.8' - Fractures (4),	$\perp$	No Recovery 90.5-91.5' Limestone	Driller's Remark: Sampler clogged; shoe jammed -				
-	R10-NQ 5 ft	0		horizontal, smooth, planar to undulating 96.5-97.0' - Fracture zone, horizontal, dark stains on faces, pieces 3" x 2", many bedding plane fractures		91.5-92.2' - pale yellowish brown,  (10YR 6/2), fine grained, strong HCl reaction, weak (R2), 5% coverage of voids 1/16" or less, 5% cavities up to  1" x 3/8" partially infilled with fine grain carbonaceous material	clogged; snoe jammed closed with rock resulting in sample loss				
100 -57.3 -	10%						NR	- - - -		92.2-93.8' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate to strong HCI reaction, very weak (R1), 10-20% coverage of voids 1/2" or less, trace cavities up to 3/8" in diameter,	R10: 9 minutes
-	101.5		4	-	匚	moderately fossiliferous, trace black organic material at 93.6' up to 1/16"	-				
- - - - 105 -62.3	R11-NQ 5 ft 10%	0	NR	101.6-101.8' - Fracture zone		diameter 93.8-95.9' - pale yellowish brown, (10YR 6/2), fine grained, strong HCl reaction, weak (R2), 5% coverage of voids 1/16" or less, 5% cavities up to 1" x 3/8" partially infilled with fine grain sized material (carbonaceous), clay seam at 95.2-95.4' (CL) yellowish gray (5Y 7/2) No Recovery 95.9-96.5' Limestone 96.5-97.0' - grayish yellow, (5Y 7/2),	- - - - - - R11: Run time not				
_	106.5			-	臣	fine grained, strong HCl reaction, very weak to weak (R1 to R2), trace voids 1/16" or less, no visible cavities	recorded -				
-			7	106.8' - Bedding plane, horizontal, smooth, planar, tight	H	or fossils  No Recovery 97.0-101.5' Limestone	-				
-			>10	106.9, 106.95, 107.0, 107.1, 107.2 107.5' - Bedding plane (6), horizontal, smooth, undulating to stepped	E	101.5-102.0' - very pale orange to grayish orange, (10YR 8/2, 10YR	-				
-	R12-NQ 5 ft 69%	0	>10	107.5-109.3' - Fracture zone, horizontal, smooth, undulating, bedding plane fractures, up to 1/8" open	Ė	7/4), fine to medium grained, strong HCl reaction, very weak (R1), 15% coverage of voids 3/16" or less, fossil					
110	09/0		>10	109.3-109.65' - Fracture zone	H	L casts up to 10% No Recovery 102.0-106.5'					
-67.3 - -	111.5		NR	-		Limestone 106.5-109.95' - Same as 101.5-102.0' except extremely weak (R0) from 107.2-109.3' No Recovery 109.95-111.5'	R12: Run time not recorded -				



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-11	SHEET	7	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723966.3 N, 457786.7 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS : 6.0	ft bg	s on 5	/20/07 START : 5/19/2007 END : 5/	20/200	D7 LOGGER : J. Burkard, C. Dellaria	a, B. Ellis
				DISCONTINUITIES	ڻ ن	LITHOLOGY	COMMENTS
N AND	74N 0% 0%		ES	DESCRIPTION	J.C	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			>10	111.5-111.9' - Bedding plane, horizontal, smooth, planar, 1" bedding 111.9-112.4' - Fracture zone		<b>Limestone</b> - 111.5-111.65' - Same as 101.5-102.0'	-
-			>10	112.65-115.75' - Bedding plane, smooth, planar to undulating, 1/8" to 1/2" beds	Ħ	<ul> <li>111.65-115.25' - yellowish gray, (5YR</li> <li>7/2), fine grained, very weak (R1), trace voids up to 1/16", thinly bedded</li> </ul>	-
-	R13-NQ 5 ft 85%	0	>10			(1/8"-3/4"), extremely weak rock (R0) - at 114.3-114.9'	-
11 <u>5</u> -72.3			>10	-		- 	_
-	116.5		>10 NR	-		No Recovery 115.75-116.5'	R13: 5 minutes
-			>10	116.6, 116.7, 116.85, 117.45, 117.55, 117.7, 117.9, 118.0, 118.1, 118.15, 118.5, 118.8' - Bedding plane or mechanical break (12), 10	H	Limestone  116.5-119.1' - yellowish gray, (5Y 8/1), medium grained, strong HCI	_
-	DAANO		7	deg, rough, undulating 117.0-117.2' - Fracture zone -	Ħ	reaction, weak (R2), trace voids up to 1/16", no visible cavities, trace fossil casts 3/8" X 3/16", trace dark organic material	-
-	R14-NQ 5 ft 72%	13	>10	119.0-119.5' - Fracture zone		119.1-120.1' - yellowish gray, (5Y 8/1), medium to coarse grained,	-
120 -77.3 -			1 NR	119.8' - Fracture, 15 deg, smooth, undulating, — tight	Ħ	<ul> <li>strong HCl reaction, weak (R2), 15-25% coverage of voids to 3/16", fossil casts up to 1" x 3/8" over 60%</li> </ul>	R14: 3 minutes
-	121.5		1411		片	of rock No Recovery 120.1-121.5'	_
-			4	121.65, 121.75, 121.8, 122.4, 122.65, 122.8' - Bedding plane or mechanical break (6), 10 deg, rough to smooth, planar to undulating,		Limestone - 121.5-123.25' - Same as - 116.5-119.1'	-
-	D45 NO		10	1/8"-1/4" open 122.9-123.25' - Fracture zone or bedding plane, 10 deg, smooth, undulating, 1/4" open,		- _ 123.25-123.85' - Same as	_ _
-	R15-NQ 5 ft 47%	12	-	beds are 1/2" thick 123.35-123.6' - Fracture zone, fine to coarse pieces		119.1-120.1' except 5-10% coverage of <3/8" fossil casts No Recovery 123.85-126.5'	-
12 <u>5</u> -82.3 -			NR	123.75' - Fracture, 20 deg, rough, undulating		<del></del> -	R15: 4 minutes
-	126.5			- 126 6 126 05 127 1 127 2 127 25 127 4	$\exists$	- - Limestone	Driller's Remark: Last foot - "feels like gravel"
-			6	126.6, 126.95, 127.1, 127.2, 127.35, 127.4, 127.6, 127.7, 127.8' - Fractures (9), horizontal, smooth to rough, undulating,	H	- 126.5-128.4' - Same as 116.5-119.1'	- -
-	B45.15		6	along bedding, tightly healed to 1/8" open 127.85-127.95' - Fracture zone 128.2, 128.4, 128.6, 128.75, 128.85, 129.0,	峀	- - 128.4-129.25' - Same as	
-	R16-NQ 5 ft 70%	8	7	129.2, 129.45, 129.6, 129.75, 129.8' - Fractures (11), horizontal, rough, undulating, 1/8" -1/4" open	Ħ	119.1-120.1'	_
130 -87.3			3	_	団	_	-
-			NR	-	Ħ	<del>-</del> -	R16: 3 minutes
-	131.5				H		



PROJECT NUMBER:

33884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723966.3 N, 457786.7 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS : 6.0	ft bg	s on 5/	20/07 START : 5/19/2007 END : 5/	20/200	D7 LOGGER : J. Burkard, C. Dellaria	ı, B. Ellis
≥∩≘	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 135 -92.3	R17-NQ 5 ft 17% 136.5	0	4 NR	131.5-131.7' - Fracture zone 131.95-132.2' - Bedding plane, 5 deg, smooth, planar to undulating, 1/4" open		Limestone  129.25-130.0' - yellowish gray, (5YR 7/2), medium grained, weak (R2), trace small (<1/16") voids and trace fossil casts interbedded with medium to coarse grained limestone with 15-25% coverage by small (1/16") voids and 60% coverage by fossil casts, layers are 2"-4" thick  No Recovery 130.0-131.5'  131.5-132.35' - Same as 116.5-119.1'  No Recovery 132.35-136.5'	Driller's Remark: Brief loss of circulation
- - - - 140 -97.3	R18-NQ 5 ft 67%	0	>10 >10 >10 1	136.5-137.7' - Fracture zone or bedding plane, 10 deg, smooth, planar to stepped, thin beds, 1/3" open, beds are 1/4"-2"  137.7-138.95' - Fracture zone or bedding plane, 5 deg, rough, planar to undulating, open 1/8" or less  139.2, 139.45, 139.6' - Bedding plane or mechanical break (3), 10 deg, rough, planar, tight		Limestone  136.5-137.6' - Same as 116.5-119.1'  137.6-139.85' - very pale orange,  (10YR 8/2), medium grained, strong  HCI reaction, weak (R2), 5-15% coverage of voids to 1/8", trace fossil  casts 3/8" x 3/16", no visible cavities, trace dark gray and light gray inclusions, dark laminations at  138.35-138.5', thin beds and laminates 1/4"-1/2"  No Recovery 139.85-141.5'	- - - - - R18: 5 minutes
-	141.5				H		-
   145 -102.3	R19-NQ 5 ft 78%	14	5 >10 >10	141.55, 141.7, 141.9, 142.3, 145.05, 145.15' - Bedding plane or mechanical break (6), 10 deg, smooth to rough, planar, 1/8"- 1/4" open 142.4, 143.2' - Fractures (2), <5-90 deg, smooth to rough, planar, bedding plane separation zone, beds are up to 1" thick 143.2-144.15' - Fracture zone, 0-90 deg, rough, undulating to stepped, open up to 1", angular fragments 144.15-144.7' - Fracture zone		Limestone  141.5-143.2' - yellowish gray, (5YR 7/2), medium grained, strong HCI reaction, weak (R2), trace voids up to 1/16", no visible cavities, trace fossil casts 3/8" X 3/16", trace dark organic material  143.2-144.2' - yellowish gray, (5Y 7/2), fine grained, strong HCI reaction, medium strong (R3), trace voids up to 1/16", 10-15% coverage of cavities up to 1 9/16" x 3/8"  partially infilled with medium grain	- - - - - R19: Run time not
-	146.5		7 2	146.6, 146.7, 147.1, 147.15, 147.25, 147.9' - Bedding plane or mechanical break (6), 10 deg, smooth, undulating, tight to 1/4" thick 146.9-147.1' - Fracture zone 147.5-147.65' - Fracture zone		<ul> <li>sized carbonate material, fossil molds, trace dark (organic) infill</li> <li>144.2-145.3' - pale yellowish brown,</li> <li>(10YR 6/2), fine grained, weak (R2),</li> <li>5-10% coverage of voids up to 3/16",</li> <li>5-10% coverage of cavities up to 3/8"</li> <li>x 9/16", dark laminations at 145.1'</li> <li>145.3-145.4' - yellowish brown,</li> <li>(10YR 6/2), mild HCI reaction.</li> </ul>	recorded -
150 -107.3 -	R20-NQ 5 ft 62%	30	1 0 NR	149.2-149.6' - Fracture, 70 deg, smooth to rough, undulating, tight		medium strong (R3), no visible fossils or cavities, dark red staining on fracture surfaces  No Recovery 145.4-146.5'	R20: Run time not recorded -
1							



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-11	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723966.3 N, 457786.7 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

DEPTH, TYPE, ORIENTATION, ROUGHNESS, WEATHERING, HARDNESS, PLANARITY, INFILLING MATERIAL AND SMOOTH AND ROCK MASS OR CHARACTERISTICS    Comparison of the co	COMMENTS  SIZE AND DEPTH OF CASING, LUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.  Drilling completed at 14:56 on 5/20/07
Limestone 146.5-147.9' - moderate yellowish on 5/20 brown to yellowish gray, (10YR 6/4 to 5Y 7/2), medium to coarse grained, strong HCI reaction, very weak (R1), trace voids to 1/16", no visible cavities or fossils	LUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.  Drilling completed at 14:56
- Limestone - 146.5-147.9' - moderate yellowish on 5/20 brown to yellowish gray, (10YR 6/4 to 5Y 7/2), medium to coarse grained, strong HCI reaction, very weak (R1), trace voids to 1/16", no visible cavities or fossils	LUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.  Drilling completed at 14:56
Limestone 146.5-147.9' - moderate yellowish on 5/20 brown to yellowish gray, (10YR 6/4 to 5Y 7/2), medium to coarse grained, strong HCI reaction, very weak (R1), trace voids to 1/16", no visible cavities or fossils	Orilling completed at 14:56 on 5/20/07 - - - - -
6/4), fine to medium grained, moderate HCI reduction, medium strong (R3), trace coarse grain sized inclusions, trace voids up to 1/16°, no visible cavities or fossils  No Recovery 148.6-151.5 Bottom of Boring at 151.5 ft bgs on 5/20/2007	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-12	SHEET	1	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723919.8 N, 457828.5 E (NAD83)

ELEVATION: 43.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	VATER LEVELS: 4.3 ft bgs on 5/17/07									
				STANDARD	SOIL DESCRIPTION		COMMENTS			
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		Ĭ				
CE.		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	S C	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION			
<u> </u>	0.0			(N)	Poorly Graded Sand With Organics (SP)	S				
	0.0	4.0	00.4	0-2-2	0.0-1.25' - dark gray grading to very light to light gray	-	-			
_		1.3	SS-1	(4)	(N3 to N8 to N7), moist, very loose, very fine to fine grained, 20% organics decreasing to <5% with depth,	-	j -			
-	1.5				trace nonplastic fines, sand is silica		] -			
_					-	ł	-			
_					-	┨	-			
-					-	ł	-			
-					-		-			
_					-		-			
					-	1	-			
5 38.3	5.0				Poorly Graded Sand With Silt (SP-SM)	133	For SS-2 the last 6" SPT was weight of			
-		1.5	SS-2	2-1-0	5.0-6.5' - dusky yellow, (5Y 6/4), wet, very loose, very	詌	hammer			
-	6.5		002	(1)	fine to fine grained, trace roots, trace concretions to coarse sand-sized, 8% nonplastic fines, sand is silica		-			
-	0.5				_	111	1			
-					-	1	1			
_					-		1			
-					_		1			
					_		1			
					_	1	1			
10	10.0					<u> </u>	_]			
33.3		0.8	SS-3	34-50/4 (84/10")	Silt (ML) 10.0-10.8' - yellowish gray, (5Y 7/2), moist to wet,	Ш	_			
_	10.8			(84/10 )	$\neg$ hard, nonplastic, very rapid dilatancy, mild HCl $\neg$	ш	_			
_					reaction, trace to 10% very fine to fine sand-sized carbonate		_			
_					_	1	_			
_					-		-			
-					-	-	-			
-					-	1	-			
-					-	1	-			
-					-	1	-			
15 <u> </u>	15.0			47-50/4	Silt (ML)	НП	-			
-	15.8	0.8	SS-4	(97/10")	15.0-15.8' - yellowish gray, (5Y 7/2), moist to wet, hard, nonplastic, very rapid dilatancy, mild HCl	$\coprod$	]			
-					\ reaction, carbonate, trace fine gravel-sized limestone	1	-			
-					fragments	1				
-					-	1				
-					-	1				
-					-	1	Driller's Remark: Harder at 18'			
					-	1	]			
					_		]			
20										
						1				
I		I	I			1				



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-12	SHEET	2	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723919.8 N, 457828.5 E (NAD83)

ELEVATION: 43.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 4.3 ft b	gs on 5/1	7/07 5	START : 5/8/2007 END : 5/17/2007 LOGGEF	R:	R. Gomez, R. Bitely, T. Stewart
				STANDARD	SOIL DESCRIPTION	$\int_{0}^{\infty}$	COMMENTS
AND A	SAMPLE	SAMPLE INTERVAL (ft)  PENETRATION TEST RESULTS  COLL NAME LIGGE CROUP SYMPOL COLOR					
H H H		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	1	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
23.3	20.0				Silt With Sand (ML)	T	
_		1.2	SS-5	15-17-14 (31)	20.0-21.2' - dusky yellow, (5Y 6/4), moist to wet, dense, fine to coarse grained, nonplastic, rapid	1	1
-	21.5			(01)	dilatancy, mild to moderate HCl reaction, 5% fine gravel-sized, 20% fine to coarse sand, all carbonate	₽	<u> </u>
					Graver-sized, 20 % line to coarse sand, all carbonate	1	
						]	
_					_	1	_
_					_		
_					_	1	
_						1	_
25 <u> </u>	25.0				Silty Sand With Limestone Fragments (SM)	+	rd —
-		0.7	SS-6	17-50/6 (67/12")	25.0-25.7' - dusky vellow. (5Y 6/4), moist to wet, very	-[]	-
-	26.0			(077.2)	dense, fine to coarse grained, mild to moderate HCI reaction, 25-30% nonplastic fines, 15% fine	┨	-
-					gravel-sized limestone, all carbonate	┨	-
-					-	1	1
-					-	1	1
-					-	1	1
_					-	1	1
						1	1
30	30.0						
13.3				26-15-8	Limestone Fragments	╁	닊
_		0.9	SS-7	(23)	$\backslash$ wafer shaped fragments to 1/2" thick	₽	Щ
-	31.5				Silt With Sand (ML) 30.4-30.9' - dusky yellow, (5Y 6/4), moist to wet, very	┨	-
-					stiff, rapid dilatancy, mild to moderate HCl reaction, 20-25% very fine to medium grained sand, all	4	-
-					carbonate	1	-
-					-	1	-
-						1	-
-						1	1
35	35.0					1	1
8.3					Silty Sand With Limestone Fragments (SM)		
		1.0	SS-8	6-10-19 (29)	35.0-36.0' - dusky yellow, (5Y 6/4), moist to wet, medium dense, fine to coarse grained, mild to		
_	36.5			\ -'	moderate HCl reaction, 34% nonplastic fines, 15% fine-coarse gravel-sized limestone, all carbonate	]	
_					imiz states g.a.s. s.zes imiostorio, ali salboriato	1	_
-						1	
-						-	Driller's Remark: Hit hard layer at 38'
-						+	-
-						+	-
					-	+	1
40						+	+



PROJECT NUMBER:	BORING NUMBER:					
338884 FI	B-12	SHEET	3	OF	R	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723919.8 N, 457828.5 E (NAD83)

ELEVATION: 43.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 4.3 ft b	gs on 5/17	7/07	START : 5/8/2007 END : 5/17/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart
				STANDARD	SOIL DESCRIPTION O COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	
H BE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
3.3	40.0	0.3	SS-9	50/3	Limestone Fragments  Driller's Remark: Run was hard until last few
_				(50/3")	\ \delta \ 40.0-40.3' - light olive gray, (5Y 5/2), mild HCl \ \reaction, fragments up to 1" in size \ \delta \ \ \delta \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
_					<b>.</b>
-					-
-					
-					
-					<b> </b>
45	45.0				<b>-</b>
-1.7					Silt (ML) 45.0-46.5' - moderate olive brown, (5Y 4/4), moist to
		1.5	SS-10	10-18-20 (38)	wet, dense, fine to coarse grained, mild HCI reaction,
_	46.5				57% nonplastic fines, 15-20% fine gravel-sized limestone fragments, all carbonate
_					-
-					-
-					
-					<b>-</b>
_					1
50	50.0				1
-6.7				24-37-48	Silty Sand With Limestone Fragments (SM) 50.0-51.3' - moderate olive brown, (5Y 4/4), moist to
-		1.3	SS-11	(85)	wet, dense, fine to coarse grained, mild HCl reaction, 25% nonplastic fines and 30-35% fine to coarse
-	51.5				gravel-sized limestone fragments
-					
-					<b> </b>
-					<b>1</b>
					]
_					<b>.</b>
55 <u> </u>	55.0				Silty Sand With Limestone Fragments (SM)
		0.8	SS-12	21-31-50/1 (81/7")	55.0-55.8' - moderate olive brown, (5Y 4/4), moist to
-	56.1			(01/1)	wet, dense, fine to coarse grained, mild HCl reaction, 25% nonplastic fines and 30-35% fine to coarse
-					\gravel-sized limestone fragments / -
-					1 1
] -					] [
_	60.0				] ] .
-	60.1	0.1	SS-13	50/1	Limestone Fragments  60.0-60.1' - moderate clive brown (5V 4/4) mild HCl   End soil sampling at 60.0'
-				(50/1")	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
60					Begin Rock Coring at 60.0 ft bgs
					See the next sheet for the rock core log



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-12

SHEET 4 OF 8

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723919.8 N, 457828.5 E (NAD83)

ELEVATION: 43.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS : 4.3	ft bg	s on 5/	17/07 START : 5/8/2007 END : 5/	17/20	D7 LOGGER : R. Gomez, R. Bitely,	Γ. Stewart
<b>≷</b> ∩ລ	(%)			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU STH, OVEF	(%) Q	<u>1</u> 56	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
EVEN EVEN	SORE	۵	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3.Y.ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
40 -	60.0	ш.	ш.ш.	60.1-60.3' - Mechanical break, rough,	- U)	Limestone	
-	00.0		5	undulating, multiple angles	H	- 60.0-61.8' - pale yellowish brown,	Begin rock coring at 60'
-				60.4' - Fracture, 50 deg, rough, undulating, open, dark gray accretion over 30% of	Ħ	(10YR 6/2), fine grained, mild to moderate HCl reaction, medium	-
-			5	surface, <0.01' thick	H	<ul><li>strong (R3), small voids 1/16"-1/8"</li></ul>	-
-	R1-NQ			60.75' - Fracture, horizontal, rough, undulating, tight	╂┴	over 40% of surface, trace organics, 5% voids to 3/8"	-
-	5 ft	58	>10	61.15-61.3' - Fracture zone, rough, undulating, multiple angles	Ш	- 61.8-62.6' - pale yellowish brown,	-
-	98%			61.8' - Fracture, horizontal, rough, undulating,	ш	(10YR 6/2), mild HCl reaction, extremely weak to very weak (R0 to	-
-			1	tight 62.3' - Bedding plane, horizontal, at interface	$\Box$	<ul> <li>R1), trace to 30% organics</li> <li>62.6-63.25' - Same as 60.0-61.8'</li> </ul>	-
-				with soft material	╁┼	except up to 50% coverage of small	R1: 8 minutes
-			2	62.4-62.6' - Fracture zone, soft material, multiple fragments	Ħ	<ul><li>voids and trace fossil molds/casts 63.25-64.5' - Same as 61.8-62.6'</li></ul>	=
65 <u> </u>	65.0		NR.	63.3, 64.2, 64.4' - Bedding plane (3),	仁	64.5-64.9' - Same as 60.0-61.8'	-
-			0	horizontal, rough, undulating, tight 64.5' - Fracture, 20 deg, rough, undulating,	$\Box$	<ul> <li>except 10% coverage of small voids</li> <li>No Recovery 64.9-65.0'</li> </ul>	-
-				open	世	Limestone	Driller's Remark: Very soft
-					╙	65.0-66.0' - light olive gray, grading to yellowish brown, (5Y 5/2, 10YR	at 66.0-68.0' – Assume core loss from
-	R2-NQ		NR		$\Box$	5/9), <10% small (<1/16") voids on	66.0-67.8' based on driller
-	5 ft 64%	40		•	ш	urface, deep dissolution cavity up to 1-1/2"x1" at 65.8'	report and recovery -
-			0	68.2' - Bedding plane, <20 deg, pieces		No Recovery 66.0-67.8' Limestone	Driller's Remark: Hard at
-			2	missing could be because soft material or	$\vdash$	67.8-70.0' - moderate olive brown,	68.0-70.0'
-				dissolution, open <1/8" 68.8' - Fracture, 75 deg, rough, undulating,	╁	(5Y 4/4), with compacted carbonate silts, trace fossils on surface, trace	R2: 7 minutes
70	70.0		3	open <1/8"	F	small voids to 1/16"	_
-26.7			2	69.1' - Fracture, 40-50 deg, rough, — undulating, open	H	70.0-73.45' - light olive gray,	
				69.7, 69.9' - Bedding plane (2), <10 deg, pieces missing could be because soft	片	<ul> <li>yellowish brown and moderate olive brown, (5Y 5/2, 10YR 5/9 and 5Y</li> </ul>	
_			>10	material or dissolution, open <1/8"		4/4), moderate HCl reaction, weak (R2), very weak (R1) from 70.7-71.5,	_
_			- 10	70.7, 71.85, 72.5 and 73.45' - Bedding plane (4), <5 deg, rough, undulating, open <1/8"	Н	<10% small voids to 1/16", no fossils	
_	R3-NQ 5 ft	48	2	70.85, 71.1' - Bedding plane (2), <5 deg,	$\vdash$	seen on surface	_
-	80%	. •		rough, undulating, tight 71.15-71.45' - Fracture zone	尸	<u>-</u>	]
-			>10	71.95' - Bedding plane, <5 deg, rough,	口	73.45-74.0' - yellowish brown, (10YR	
-				undulating, open 1/2" 73.8-74.0' - Fracture zone	口	- 5/4), moderate HCl reaction, very	D2: 9 minutos
-			NR		$\vdash$	weak (R1), tightly compacted silts, shows "infill" of pale olive 10YR 6/2	R3: 8 minutes
75 -31.7	75.0			75.0-75.3' - Fracture zone	$\vdash$	and medium light gray (N6), shallow	-
"'-			>10	75.0-75.3 - Fracture 2016 75.4, 75.6, 75.7' - Bedding plane (3), <10	F	dissolution features to 1/2", trace fossils to 1/4", in both the rock and	-
-				deg, rough, undulating, open to 1/8"	片	<ul> <li>tightly compacted silts the clasts/infill are up to 1/4"</li> </ul>	-
-			1	76.25' - Bedding plane, <10 deg, rough, undulating, open to 1/8", not fully broken	片	are up to 1/4"  No Recovery 74.0-75.0'	-
-	R4-NQ			anddiating, open to 170, not fully broken	世	-	Driller's Remark: No
-	5 ft	22			╀	-	resistance felt-very soft at -
-	42%				仠	-	77.0-77.5' and 78.0-78.2' _ Assume core loss from
-			NR		囯	-	77.1' onward -
-					口	-	R4: 6 minutes
80	80.0				$\Box$	-	
	55.5				T	_	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-12	SHEET	5	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723919.8 N, 457828.5 E (NAD83)

ELEVATION: 43.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS : 4.3	R ft bg:	s on 5	17/07 START : 5/8/2007 END : 5/	17/20	007	LOGGER : R. Gomez, R. Bitely,	T. Stewart
				DISCONTINUITIES	(J		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		SI.	DESCRIPTION	SYMBOLIC LOG	Г	ROCK TYPE, COLOR,	OLZE AND DEDTIL OF CARDING
HSE	Z ± Z	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	1 3		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
PTF FVA	NG CO	αD	RACT R F	PLANARITY, INFILLING MATERIAL AND	MB		AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	SHR	ď	RH	THICKNESS, SURFACE STAINING, AND TIGHTNESS			CHARACTERISTICS	
-36.7			1	80.1' - Fracture zone, rough	Ш	Ħ	Limestone 75.0-77.1' - Same as 70.0-73.45'	End drilling for the day, 80.0' at 1800 hrs on 5/9/07 –
			'		$\vdash$	Ŧ١	except color grades from pale olive	P. De Sa'Rego begins
				81.2, 81.3' - Fracture (2), 7 deg, rough,	Ľ	11	(10Y 6/2) to light olive grey (5Y 5/2)	logging borehole
			6	undulating	₽	Ħ	at 75.2', moderate yellowish brown (10YR 5/4) mottling, moderate HCl	SC-1 collected at 80.2 81.1'
_	R5-NQ			81.4-81.6 - Fracture zone 81.8' - Mechanical break, 60 deg, rough,	П	1	reaction, very weak, weak to medium	]
_	5 ft 72%	23	3	undulating, tight	ш	†	strong (R2 to R3) at 75.6-77.1', tightly compacted silts, <10% small	-
-	12/0		2	82.1' - Fracture, horizontal, rough, planar, open <1/8"	╁	ł	voids to 1/16", no fossils seen on	-
_				82.3' - Bedding plane, horizontal, smooth,	Ė	╊	surface No Recovery 77.1-80.0'	-
-				planar	世	╁	Silt (ML)	R5: 11 minutes
_			NR	82.4, 82.75, 83.1, 83.4' - Fractures, <10 deg, smooth to rough, undulating	₩	╁	80.0-80.2' - moderate yellowish	-
85 -41.7	85.0			- Sinostir to rough, and adding	口	╄	brown, (10YR 5/4), medium plasticity, 3/4" limestone fragments	
-41.7			4	85.2-85.25' - Fractures (2), 20-30 deg,	┢	╁	Limestone	-
_				smooth to rough, planar 85.35, 85.55' - Fractures (2), horizontal,	F	1	80.2-83.6' - moderate yellowish	_
_			4	rough, planar		1	brown, (10YR 5/4), moderate HCI reaction, weak to medium strong (R2	_
			·	86.2' - Fracture, horizontal, rough, undulating, tight	Н	Ł	to R3), small (1/16") voids 15-20% of	_
	R6-NQ 5 ft	20	. 10	86.3' - Mechanical break, 45 deg	Д	1	surface, larger cavities/fossil molds up to 3/4", fine grained interval from	_
	62%	20	>10	86.9' - Fracture, horizontal, rough to smooth,	Ш	1	81.3-82.5'	Driller's Remark: "soft"
				undulating, tight 87.2-87.3' - Fracture zone	$\vdash$	┨	No Recovery 83.6-85.0'	zones 87.5-88.0', 89.5- 90.0'
				87.6-87.8' - Fracture zone, 30 deg, rough,	Ľ	Ť	<b>Limestone</b> 85.0-86.0' - moderate yellowish	_
			NR	stepped to undulating, possible mechanical break	H	ł	brown, (10YR 5/4), medium grained,	R6: 5 minutes
90	90.0				$\vdash$	1	30-40% voids up to 1/8" in size, trace fossil molds/cavities up to 3/8", trace	
-46.7	50.0			90.0-90.6' - Fracture zone	口	t	fossil casts up to 5/16"	
-			>10		╁	t	86.0-88.1' - Same as 85.0-86.0' except fine grained, weak (R2),	-
-				91.1' - Mechanical break, <5 deg, rough,	╁	ł	10-20% inclusions of dark orange	-
_			4	undulating, tight, possibility due to large	Ė	1	material up to 3/8" from 87.2-87.4' No Recovery 88.1-90.0'	-
-	R7-NQ			cavity 91.65-92.2' - Fracture zone, 0-30 deg, rough,	₩	╁	Limestone	-
_	5 ft	37	4	planar to undulating	╙	╁	90.0-92.2' - Same as 85.0-86.0'	-
-	80%			93.0' - Fracture, horizontal, rough, undulating,	口	1	92.2-94.0' - grayish orange, (10YR 7/4), fine grained, weak (R2), voids	SC-2 collected at 92.6- 93.45'
-			2	1/8" relief	$\vdash$	╁	(up to 1/16") 0-5% from 92.2-93.2',	-
-				93.2' - Fracture, horizontal, smooth, planar 93.6' - Fracture, horizontal, smooth, planar,	F	1	trace fossils casts/cavities up to 3/8"x1-3/16" at 92.8' and at	D7: 9 minutes
			NR	1/4" relief	片	1	93.2-93.7', very weak rock (R1) at	R7: 8 minutes
95 <u> </u>	95.0			<u></u>	╀	L	93.0-93.2'  No Recovery 94.0-95.0'	_
-31. <i>l</i>			>10	95.05' - Fracture, horizontal, smooth, undulating, 3/16" relief	Д	1	Limestone	
				95.32-95.56' - Clay seam, horizontal, smooth,	口	1	95.0-96.3' - very pale orange, (10YR 8/2), very fine to fine grained, weak	]
			5	planar, contact on both sides, tight, some	$\vdash$	Ł	(R2), <5% voids up to 1/16" in size,	]
				black staining on lower surface 95.8-96.0' - Fracture zone	片	1	dark laminae over 50% of surface at	
1 7	R8-NQ		1	96.2-96.3' - Fracture zone	片	ſ	95.5-95.7' 96.3-97.4' - Same as 95.0-96.3'	]
1 7	5 ft 48%	28		96.65-96.95' - Mechanical break	$\vdash$	ſ	except very weak (R1), voids	]
1 1					П	Ť	(1/16"-1/8") up to 15%, fossil molds/cavities up to 3/8"x3/16" over	1
1 1			NR		口	1	5-10% of rock, poorly to moderately	1
1 -					$\vdash$	╁	fossiliferous with depth No Recovery 97.4-100.0'	R8: 8 minutes
100	100.0				Ħ	†	110 11000 tory 01.4-100.0	-
100	100.0				††	t		_
1					L			



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-12	SHEET	6	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723919.8 N, 457828.5 E (NAD83)

ELEVATION: 43.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

				147/07 CTART: 5/0/0007 FAIR: 5/		1000FD : D 0 D Ditate 3	ORIENTATION . Vertical
	LEVELS : 4.3	πpg	s on 5/	<u>/17/07 START : 5/8/2007 END : 5/</u> DISCONTINUITIES	17/20	D7 LOGGER: R. Gomez, R. Bitely, T LITHOLOGY	. Stewart COMMENTS
ĕ9€	(%) _				99	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(9)	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
TH I	RE R GT+ SOVE	(%) <sub>Q</sub>	L F	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	IBOI	WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR	COF	S Q	FRA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-56.7				400 OL Frankriga (O) 40 dan alaman arasil		Limestone	M. Faurote begins logging
-			3	100.2' - Fractures (3), 40 deg, planar, small fragments	Н	100.0-103.4' - very pale orange,	borehole -
-				100.4' - Mechanical break, 2-5 deg, smooth,	F	<ul> <li>(10YR 8/2), very fine to fine grained, strong HCl reaction, extremely weak</li> </ul>	-
-			5	planar 101.2, 101.6' - Mechanical break, 0-2 deg,	Ľ	(R0), exhibits 8-15% fossil cast	-
-	R9-NQ			smooth, planar		related open space, and there are sporadic small <1/4" shells, blebs of	-
-	5 ft	26	>10	101.8' - Fracture, 60 deg, rough, undulating, open, the fracture is sub parallel to another	Н	carbon are visible at 1% or less	-
-	68%		>10	fracture that is not separated	口	-	-
-				101.9, 101.95' - Fractures (2), fragments are 1" in diameter	$\Box$	No Recovery 103.4-105.0'	-
-			NR	102.5, 102.65, 102.7' - Bedding plane (3),	$\vdash$	=	R9: 4 minutes
-			' ' '	smooth, undulating	F	-	-
105 -61.7	105.0			_		 Limestone	_
_			>10	105.2-106.05' - Fracture zone, 0-3 deg, smooth, undulating, bedding plane		105.0-108.45' - very pale orange,	-
-				separations, primarily depositional, 1/2"	₩	<ul> <li>(10YR 8/2), very fine to fine grained, strong HCl reaction, extremely weak</li> </ul>	-
-			2	spacing	扛	(R0), thin bedding, the organic	-
_	R10-NQ			106.7' - Mechanical break	士	<ul> <li>content remains the same, but exhibits planar surface coating at</li> </ul>	-
-	5 ft	28	>10	107.1' - Mechanical break 107.2-107.7' - Fracture zone, 0-3 deg,	+	105.1', numerous 1/2" beds with	-
-	69%		0	smooth, undulating, bedding plane	$\vdash$	distinctive partings in two zones. The thin bedded materials show 10-15%	-
-			$\vdash$	separations, primarily depositional, 1/2" spacing		open space from fossil casts and	-
-			NR	108.0' - Mechanical break, horizontal	世	molds. The more persistent, larger beds exhibit larger shell openings	R10: 5 minutes
			INIX	-	₽	and small dissolution cavities up to	-
110_ -66.7	110.0			_	F	3/8" No Recovery 108.45-110.0'	There is a saybonate sand
-			3	-		Limestone	There is a carbonate sand associated with some of
-				110.7-112.0' - Bedding plane, multiple partings with beds from 1/8" or less to 8" or	ш	_ 110.0-113.45' - very pale orange, (10YR 8/2), very fine to fine grained,	the lost recovery zones. – This limestone continues to
-			2	more	Н	<ul> <li>strong HCl reaction, extremely weak</li> </ul>	at least 115.0'
_	R11-NQ			-	$\vdash$	(R0), exhibits 8-15% fossil cast related open space, and there are	=
-	5 ft	22	>10	-	Ė	<ul> <li>sporadic small &lt;1/4" shells, blebs of</li> </ul>	-
-	69%		>10	-	世	_ carbon are visible at 1% or less	-
-				-	$\vdash$	No Recovery 113.45-115.0'	-
-			NR	-	F	-	R11: 6 minutes
445	115.0		` ` `	-	圧	-	End drilling for the day at
115 -71.7	115.0			_	世	No Recovery 115.0-120.0'	17:51 on 5/10/07 D. Whitaker begins logging
-				-	╁	-	borehole -
-				-	$\vdash$	-	Core barrel slid back to
-				-	Ħ	-	bottom of hole -
-	R12-NQ			-	Ħ	-	Medium dark sand grains
-	5 ft 0%	0	NR	-	ᡛ	-	on outside of barrel -
-	U 70			-	F	-	may/may not not be _ carbonate
-				-	口	-	-
-				-	口	-	R12: 5 minutes
120	120.0			-	Н	-	=
120	120.0						_



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-12	SHEET	7	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723919.8 N, 457828.5 E (NAD83)

ELEVATION: 43.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS : 4.3	ft bg	s on 5/	17/07 START : 5/8/2007 END : 5/	17/200	D7 LOGGER : R. Gomez, R. Bitely,	T. Stewart
				DISCONTINUITIES	ڻ ن	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-76.7					Н	No Recovery 120.0-125.0'	Water level 4.3' below
- - - - - - - 125	R13-NQ 5 ft 1 0%	0	NR			- - - - - -	ground at 08:00, 05/17/08  Interval may be sand, not rock
-81.7	120.0				Ħ	No Recovery 125.0-130.0'	-
- - - - -	R14-NQ 5 ft 0%	0	NR			- · · · · · · · · · · · · · · · · · · ·	- - - - - R14: 3 minutes
130	130.0				Ħ	=	1
-86.7 - - - -	R15-NQ		>10 >10 >10	130.0-130.4' - Fracture zone, rough, undulating, gravel size fragments <2" diameter 130.5-132.25' - Bedding plane (14), <10 deg, smooth to rough, undulating, tight to open 1/2"		Limestone  130.0-132.3' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, extremely weak to very weak (R0 to R1), trace voids, no cavities, no fossil molds	- - - -
-	5 ft 46%	0		-	Ħ	- No Recovery 132.3-135.0'	-
- - - 135			NR	- - -		- - -	R15: 4 minutes
-91.7			>10		Н	Limestone	
-			>10	Fracture zone (6), rough, undulating, gravel size fragments <1" diameter 135.2-135.45, 135.6, 135.85-135.95,		135.0-135.7' - yellowish gray, (5Y 8/1), very fine to medium grained, extremely weak to very weak (R0 to	-
-	R16-NQ			136.35-138.05' - Bedding plane or mechanical break (18), <10 deg, smooth to	H	<ul> <li>R1), trace coarse grains</li> <li>135.7-136.2' - Same as 135.0-135.7' except very fine to fine grained,</li> </ul>	-
	5 ft 70%	20	1	rough, undulating, open <3/4"	Ħ	medium strong (R3), no voids 136.2-138.5' - Same as 135.0-135.7'	1
-			>10		Ħ	except fine to coarse grained, strong HCl reaction, voids 1/4" or less over	]
140	140.0		NR			10% of surface, trace fossils and fossil molds, no cavities  No Recovery 138.5-140.0'	R16: 5 minutes



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-12	SHEET	8	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723919.8 N, 457828.5 E (NAD83)

ELEVATION: 43.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.3	3 ft bg:	s on 5/	/17/07 START : 5/8/2007 END : 5/	17/20	D7 LOGGER : R. Gomez, R. Bitely,	T. Stewart
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-96.7 - -			9 >10	140.1-140.9' - Bedding plane (8), <10 deg, slickensided to rough, undulating, open 1/2" or less 140.95-141.4, 142.0-142.4' - Fracture zone (2), rough, stepped to undulating, fine to		Limestone  - 140.0-141.0' - yellowish gray, (5Y 8/1), very fine to medium grained, strong HCl reaction, extremely weak to very weak (R0 to R1), trace small	-
-	R17-NQ 5 ft 48%	10	>10	coarse gravel sized fragments <2" diameter		(1/16" or less) voids, few fossils, trace recrystallization, trace coarse grained 141.0-142.4' - yellowish gray, (5Y	-
- - - 145_	145.0		NR			8/1), very fine grained, moderate HCl reaction, medium strong (R3), <5% coverage of small (1/16") voids, 10% cavities and fossil molds, trace fossils  No Recovery 142.4-145.0'	R17: 9 minutes -
-101 <u>.7</u> -			2	145.6' - Fractures (2), 60 deg, smooth and undulating, rough and stepped, perpendicular fractures, open <1/8"		Limestone 145.0-146.05' - yellowish gray, (5Y 8/1), very fine grained, moderate HCl reaction, weak (R2), 5% voids 1/16"	-
-	R18-NQ 5 ft 90%	72	0	146.0' - Mechanical break 146.3-146.9' - Bedding plane (5), <10 deg, slickensided to rough, undulating, open <1/2"		over 50% of interval, no cavities or fossils 146.05-149.5' - yellowish gray, (5Y 8/1), very fine to medium grained,	SC-3 collected at 147.0- 148.0'
-	90 /6		1	148.0' - Mechanical break  148.85-149.45' - Bedding plane (4), <10 deg,		<ul> <li>strong HCl reaction, very weak (R1), 20% coverage of voids 1/16", trace</li> <li>fossils and fossil molds</li> </ul>	- R18: 8 minutes
150_	150.0		3 NR	slickensided to rough, undulating, open <1/2"		No Recovery 149.5-150.0'	-
-106.7 						Bottom of Boring at 150.0 ft bgs on 5/17/2007	Total depth is 150.0'



PROJECT NUMBER:	BORING NUMBER:			
338884.FL	B-13	SHEET	1 OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723995.1 N, 457903.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

						lary, carriedu, invv rous, 5-7			ONIENTATION: Vertical
WATER	LEVELS	: 2.0 ft bo	gs on 6/0	5/07 <b>1</b>	START : 6/5/2007	END : 6/6/2007	LOGGE	R : R.	McComb
30€				STANDARD PENETRATION		SOIL DESCRIPTION		g P	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBO	I COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
ACE		RECOVE	RY (ft)		MOISTURE	E CONTENT, RELATIVE DI	ENSITY OR	30	DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6"	CONSISTEN	NCY, SOIL STRUCTURE, M	IINERALOGY	₹	INSTRUMENTATION
<b>42.2</b>	0.0			(N)	∖ Topsoil			1 7 7	
	0.0			2-2-2		gray, (N2), moist, very fir	ne to fine	-	_
_		0.9	SS-1	(4)		nic fines, silica sand		-	
l -	1.5				Poorly Graded	d Sand With Organics (S to medium gray, (N7 to N	6) moist very	1	_
l _					loose, very fine	e to fine grained, trace no	inplastic fines.	1	_
l _					10-15% organi depth, silica sa	ic fines and rootlets, decr	easing with	]	
					uepin, silica sa	anu			
								1	
_								1	1
-								1	_
5	5.0							1	1
37.2	0.0				Silty Sand (SM	VI)		<b>Т</b> Ш	
-		0.6	SS-2	1-1-0	5.0-5.6' - mode	erate yellowish brown, (10 HCl reaction, 10% fines,	OYR 5/4), wet,	╫	-
-	0.5	0.0	002	(1)	(non carbonate	e) gravel, silica sand	trace black	1	-
-	6.5				(			1	-
-								┨	-
-								4	-
_								4	_
_								4	_
-								4	_
l _								1	_
10	10.0								
32.2					Silt (ML)	aviah aranga (10VD 7/0)	wat hard		
		1.1	SS-3	29-30-34 (64)	rapid dilatancy	ayish orange, (10YR 7/2) /, mild HCl reaction, trace	, wel, nard, very	1111	
	11.5			(0.)	fine-grained sa	and, all carbonate	/	7111	1
_								1	]
_								1	1
-								1	-
-								1	-
-								1	-
-								1	-
								1	-
15 <u> </u>	15.9	01	SS-4 /	50/1	\[     \] Limestone Fra	agments		+	-
-'		\ <u> </u>	\	(50/1")	\ 15.0-15.1' - gra	ayish orange, (10YR 7/2) emely weak (R0), coarse s	, mild HCl	-	-
-					reaction, extre	mely weak (R0), coarse s	sand-sized	-	-
-					pyrite riodules			4	_
-								1	_
_								1	
l _								]	
								]	
									]
-								1	]
20								1	]
							_	1	
								$\bot$	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-13	SHEET	2	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723995.1 N, 457903.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLIN	G METH	OD AND	EQUIPM	ENT : CME 550 S	/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 2.0 ft b	gs on 6/0	5/07	START : 6/5/2007 END : 6/6/2007 LOGGER : R. McComb
l				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
BEL ON ON		RECOVE	ERY (ft)	1.20111230213	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT. RELATIVE DENSITY OR DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS. TESTS. AND
THT.			#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR ONSISTENCY, SOIL STRUCTURE, MINERALOGY SINSTRUMENTATION
SUF			#1175	(N)	S
22.2	20.0				Silty Gravel With Sand (GM)
-		1.2	SS-5	29-36-26	20.0-21.2' - grayish orange, (5Y 8/4), wet, very dense, fine to coarse grained, mild HCl reaction, 30% fine to
-				(62)	coarse limestone gravel, 30% nonplastic fines
-	21.5				-
-					
_					-   O
_					Some rig chatter from 20-25'
_					<b>」</b>
]				ĺ	]
25	25.0				11
17.2					Sandy Silt (ML)
-		0.6	SS-6	5-11-14	25.0-25.6' - grayish yellow, (5Y 8/4), wet, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction.
-	00.5	0.0		(25)	25-30% fine to medium grained sand, trace fine
-	26.5				gravel, all carbonate
-					
_					<b>-</b>
_					<b>]</b>
_					<b></b>
					<b>」</b>
					] [
30	30.0				1
12.2	38.0 38.2	0.0	SS-7	50/2	No Recovery 30.0-30.2'
-				(50/2")	-
-					<b> </b>
_					
-					
-					
-					<b> </b>
_					<b>_ _ _</b> .
_					<b>]</b>
					]
35	35.0				
7.2				00 15 :-	Silty Sand With Limestone Fragments (SM)
		1.3	SS-8	32-43-50/5 (93/11")	35.0-36.3' - grayish yellow, (5YR 8/4), wet, very dense, fine to coarse grained, mild to moderate HCl
_	36.4			(55/11)	reaction, 20-25% nonplastic fines, 30% fine to coarse
-					limestone gravel, organic black staining on some rock /-
-				ĺ	maginents, all carbonate
-					
-					Hard drilling at 38'
_					That's strilling at 50
	40.0 40.2		00.5	F0/2 F	
_	40.2	0.1	SS-9	50/2.5 (50/2.5")	Limestone Fragments 40.0-40.1' - light olive gray, (5Y 5/2), mild HCl
40				(00,2.0)	reaction, extremely weak (R0)
		1	1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-13	SHEET	3	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723995.1 N, 457903.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

WATER	LEVELS: 2.0	ft bgs	s on 6/	/05/07 START : 6/5/2007 END : 6/	6/200	7 LOGGER : R. McComb	
≥∩ ::	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		RES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
FH BE	E RU 3TH, OVEF	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP- SURI ELE\	COR LENC REC	RQI	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
2.2	40.0			40.0-40.35' - Fracture zone, limestone	Ė	Limestone	At 40.0' switched over to
-			10	fragments, various orientations 40.35' - Bedding plane or mechanical break,	$\perp$	- 40.0-41.7' - dusky yellow, (5Y 6/4), mild to moderate HCl reaction, weak	NQ rock coring -
-			1	horizontal, rough, planar, loose	Ь	(R2), fossiliferous (casts/molds) with	1
_				41.35' - Fracture, horizontal to 40 deg, rough, stepped, loose	$\vdash$	<ul> <li>some cavities generally 3/8"x3/16", voids up to 1/16" over 25%-30% of</li> </ul>	-
	R1-NQ 5 ft 34%	20			H	rock surface, light olive gray intraclasts, suspended in fine grained	
_		20	20	_	F	matrix (intraclasts typically 3/8"x3/16"	
_			NR	_	Ħ	or less). - No Recovery 41.7-45.0'	
_					H	- -	D4: 0 minutes
-				-	H	<del>-</del>	R1: 3 minutes
45 -2.8	45.0			45.41 Franking 70 day reverb plants (* ) 1	世	 Limestone	-
			4	45.1' - Fracture, 70 deg, rough, planar, tight 45.5' - Bedding plane, horizontal, undulating,	H	- 45.0-49.4' - Same as 40.0-41.7'	-
-				loose	₩	except very weak (R1)	Driller's Remark: 46.0-48.0'
-			0	45.65' - Fracture, 60 deg, rough, stepped, loose	F	-	very soft -
-	R2-NQ			45.9' - Fracture, 50 deg, rough, undulating, - loose	囯	-	-
-	5 ft 88%	69	2	47.2' - Bedding plane, horizontal to <5 deg,		-	-
_			_	rough, stepped, loose 47.5, 47.8' - Fractures (2), horizontal to >80		-	1
_			1	deg, rough, undulating, extending into incipient fracture trace that dies out		_	-
			0	48.75' - Bedding plane, <5 deg. rough.	Ь	[ ,, _	R2: 3 minutes
50	50.0		NR	undulating, loose, intersected by incipient fracture that is nearly vertical and dies out at		No Recovery 49.4-50.0'	
-7.8			2	end of R2 50.35' - Fracture, 20 deg, rough, undulating,	┢	<b>Limestone</b> - 50.0-53.5' - Same as 40.0-41.7'	_
_				tight -	F	except cavities more common up to 3-5%, fossiliferous cast/molds	_
_			1	50.7' - Fracture, 70 deg, rough, stepped/undulating, tight, black organic	H	<ul> <li>becoming more fossiliferous with</li> </ul>	-
-	R3-NQ			staining on 1-3% surface 51.8' - Fracture or mechanical break, <5 deg,	F	depth, extremely weak zone (R0) from 52.65 to 56.85', incipient	-
-	5 ft	72	1	rough, stepped, loose	Ħ	rracture from 50.9-51.2', inclined 70	Driller's Remark: 52.5-53.0'
-	82%			52.65' - Fracture or mechanical break, <5 deg, rough, stepped, tight	Ľ	degrees. 53.5-54.1' - yellowish gray, (5Y 7/2),	soft -
-			3	53.01' - Fracture, 40 deg, rough, undulating,	世	fine to very fine grained, moderate to strong HCl reaction, weak to medium	Driller's Remark: 53.5-54.5'
-				tight 53.3-53.45' - Fracture zone, rough, stepped	H	strong (R2 to R3), voids covering	soft – R3: 5 minutes
55	55.0		NR	to undulating, 60-70 deg to horizontal, tight to loose	H	- 10%-15%, cavities rare (<3/16"x3/16").	
-12.8	23.0				F	No Recovery 54.1-55.0'	
_			1	55.95' - Bedding plane or mechanical break, horizontal to <5 deg, rough, stepped, loose	上	- Limestone 55.0-55.9' - Same as 53.5-54.1'	
			>10		Д	55.9-58.5' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 5/6), mild	SC-1 collected at 55.0- 55.95'
_			- 10	56.38-56.7' - Fracture zone, gravel-sized limestone rock fragments, various	$\perp$	HCl reaction, weak (R2), with thin	
_	R4-NQ 5 ft	18	10	orientations 56.9-57.05' - Fracture zone, various	口	wispy laminae of black organic (N1) material, fossiliferous (casts and	]
-	70%	-		orientations	口	molds), voids covering 35-40% of surface and cavities generally less	] -
-			2	57.4-57.6' - Fracture zone, same as 56.38-56.7'	$\vdash$	than 3/16"x3/16".	-
-			NID	-	+	No Recovery 58.5-60.0'	R4: 5 minutes
-	CO O		NR	-	$\vdash$	+	-
60	60.0				f		-
					L		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-13	SHEET	4	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723995.1 N, 457903.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

				IENT : CIVIE 350 3/N 1800/3, Midd Tolary, NQ 10018, NVV			
WATER	LEVELS : 2.0	ft bgs	s on 6	05/07 START : 6/5/2007 END : 6/	<u>6/2007</u>	LOGGER : R. McComb	
>				DISCONTINUITIES	υ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표한한	2 4 K	9	품드		윽	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
I ∓X €	A TES	(%) Q	달	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BO	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
F. E. E.	RNI	Ø	FRACTURES PER FOOT	PLANARITÝ, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	≥	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	075	œ	Ъ		S		
-17.8			_	57.9-58.25' - Fracture zone, horizontal to 60	Н	Limestone	
_			3	deg, rough, with bedding plane fractures at 58.15' and 58.25', inclined fracture from	ш	<ul> <li>60.0-63.45' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y</li> </ul>	1
-	1			57.9-58.15', rough, undulating to stepped,	H	4/4), fine to very fine grained,	-
-	R5-NQ		0	loose.	╀┼┼	moderate to strong HCl reaction,	-
				60.5, 60.6, 60.7' - Bedding plane (3),	Ш	weak to medium strong (R2 to R3),	
				horizontal to <5 deg, rough, stepped, loose		fossiliferous (casts/molds), voids up	Driller's Remark: 62.0-64.0'
-	5 ft	55	10	62.15-62.55' - Fracture zone, rough,	╁┼┼	<ul> <li>to 1/16" covering up to 50-60% surface, extremely weak rock (R0)</li> </ul>	very soft -
-	69%		_	extremely soft rock, some bedding plane fractures horizontal to vertical,	丗	from 60.1' to 62.5' with some silt and	Drillor's Romark: All fairly
_			0	undulating/stepped, tight to loose	$\Box$	- sand-sized limestone rock	Driller's Remark: All fairly soft to 64.0'
				этгийн байгаар байгаа байгаа	Н	fragments, some voids up to 3/8-3/4"	con to o no
_	1		NR		ш	x 3/8-3/4".	R5: 4 minutes
-			""		幵	No Recovery 63.45-65.0'	-
65	65.0			_	₽₽	_	I
-22.8			4	65.1, 65.2' - Bedding plane (2), horizontal to		Limestone	
	1		4	<5 deg, rough, stepped, loose	ш	- 65.0-69.4' - Same as 60.0-63.45' except extremely weak rock (R0)	1
-	1			65.5' - Bedding plane, <5 deg, rough, loose 65.8, 66.35' - Bedding plane (2), <5 deg,	₩	(similar to 62.1-62.5') from 66.0-66.7'	-
-			2	rough, loose	╆	and 69.0-69.4'.	-
_				66.7- 67.7' - Fracture zone, >80 deg to	Н	_	_
	R6-NQ			vertical, series of several fractures, rough,	Н		
-	5 ft	26	>10	undulating to stepped, loose	ш	-	1
_	88%				╁┼	-	-
_			0		╀	-	_
-	1		1	69.0-69.1' - Fracture zone, horizontal to 60	Н	•	R6: 4 minutes
			NR	deg, rough, undulating, tight	†††	No Recovery 69.4-70.0'	Driller's Remark: 69.5-70.0'
70 -27.8	70.0			_	₩	Limestone	very soft —
-27.0			1	70.1-70.15' - Fracture zone, horizontal to 60	Н	- 70.0-73.1' - light olive gray, (5Y 5/2),	_
			•	deg, rough, stepped, loose		moderate HCl reaction, weak to	
				71.15' - Fracture, horizontal to 40 deg, rough,	ш	medium strong (R2 to R3),	SC-2 collected at 70.15-
			3	stepped, loose			
1			-		+ + +	fossiliferous (casts and molds) with	71.1'
_	<b>5-</b> No.			71.35' - Mechanical break or fracture, 50 deg,	Ħ	voids up to 1/16" over 15-20% of	Driller's Remark: 71.5-72.0' -
-	R7-NQ	16		71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight	Ħ	voids up to 1/16" over 15-20% of surface and occasional cavities,	
-	R7-NQ 5 ft 62%	16	10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae	Driller's Remark: 71.5-72.0' -
-	5 ft	16		71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.	Driller's Remark: 71.5-72.0' -
-	5 ft	16		71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine	Driller's Remark: 71.5-72.0' - soft -
- - - -	5 ft	16	10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.	Driller's Remark: 71.5-72.0' - soft - Driller's Remark: 73.0-74.5' very soft -
-	5 ft	16		71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break,		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.	Driller's Remark: 71.5-72.0' - soft - Driller's Remark: 73.0-74.5' very soft - R7: 4 minutes -
- - - - - - 75	5 ft 62%	16	10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone	Driller's Remark: 71.5-72.0' - soft - Driller's Remark: 73.0-74.5' very soft - R7: 4 minutes - End on 6/5/07, water
- - - - - 75 -32.8	5 ft	16	10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 —		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained. No Recovery 73.1-75.0'  Limestone 75.0-76.5' - Same as 70.0-73.1'	Driller's Remark: 71.5-72.0' - soft - Driller's Remark: 73.0-74.5' very soft - R7: 4 minutes - End on 6/5/07, water approx. 2.0' below ground
	5 ft 62%	16	10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from	Driller's Remark: 71.5-72.0' - soft - Driller's Remark: 73.0-74.5' very soft - R7: 4 minutes - End on 6/5/07, water approx. 2.0' below ground - surface - sufface
	5 ft 62%	16	10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5'; clasts up to 3/8" in length;	Driller's Remark: 71.5-72.0' - soft - Driller's Remark: 73.0-74.5' very soft - R7: 4 minutes - End on 6/5/07, water approx. 2.0' below ground surface Start on 6/6/07, water
	5 ft 62%	16	10 NR	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough,		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from	Driller's Remark: 71.5-72.0' - soft - Driller's Remark: 73.0-74.5' very soft - R7: 4 minutes - End on 6/5/07, water approx. 2.0' below ground - surface - sufface
	5 ft 62%	16	10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5'; clasts up to 3/8" in length; medium gray (N5), mild reaction to HCI, rounded clasts. 76.5-77.3' - medium dark gray, (N4),	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface - Start on 6/6/07, water approx. 2.0' below ground -
	5 ft 62%	16	10 NR	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight 75.85' - Bedding plane, horizontal to 70 deg,		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5'; clasts up to 3/8" in length; medium gray (N5), mild reaction to HCI, rounded clasts. 76.5-77.3' - medium dark gray, (N4), very fine grained, moderate HCI	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface - Start on 6/6/07, water approx. 2.0' below ground -
	5 ft 62%	16	10 NR	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight 75.85' - Bedding plane, horizontal to 70 deg, rough, planar, loose		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5'; clasts up to 3/8" in length; medium gray (N5), mild reaction to HCl, rounded clasts. 76.5-77.3' - medium dark gray, (N4), very fine grained, moderate HCl reaction, medium strong (R3), trace	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface - Start on 6/6/07, water approx. 2.0' below ground -
	5 ft 62%		10 NR 2 >10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight 75.85' - Bedding plane, horizontal to 70 deg, rough, planar, loose 76.3' - Bedding plane, horizontal, rough,		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5'; clasts up to 3/8" in length; medium gray (N5), mild reaction to HCI, rounded clasts. 76.5-77.3' - medium dark gray, (N4), very fine grained, moderate HCI reaction, medium strong (R3), trace fossil casts/molds, zones of thinly	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface Start on 6/6/07, water approx. 2.0' below ground surface -  Start on 6/6/07, water approx. 2.0' below ground surface -
	5 ft 62% 75.0 R8-NQ 5 ft		10 NR 2 >10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight 75.85' - Bedding plane, horizontal to 70 deg, rough, planar, loose 76.3' - Bedding plane, horizontal, rough, planar 76.4-76.9' - Fracture zone, gravel (limestone)		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from emedium gray (N5), mild reaction to HCl, rounded clasts. 76.5-77.3' - medium dark gray, (N4), very fine grained, moderate HCl reaction, medium strong (R3), trace fossil casts/molds, zones of thinly laminated limestone with <1.0%	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface Start on 6/6/07, water approx. 2.0' below ground surface -  Start on 6/6/07, water approx. 2.0' below ground surface -
	5 ft 62% 75.0 R8-NQ 5 ft		10 NR 2 >10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight 75.85' - Bedding plane, horizontal to 70 deg, rough, planar, loose 76.3' - Bedding plane, horizontal, rough, planar 76.4-76.9' - Fracture zone, gravel (limestone) various orientations, generally planar to		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5', clasts up to 3/8" in length; medium gray (N5), mild reaction to HCl, rounded clasts. 76.5-77.3' - medium dark gray, (N4), very fine grained, moderate HCl reaction, medium strong (R3), trace fossil casts/molds, zones of thinly laminated limestone with <1.0% voids grading to zones with voids up	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface Start on 6/6/07, water approx. 2.0' below ground surface -  Start on 6/6/07, water approx. 2.0' below ground surface -
	5 ft 62% 75.0 R8-NQ 5 ft		10 NR 2 >10 3 1	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight 75.85' - Bedding plane, horizontal to 70 deg, rough, planar, loose 76.3' - Bedding plane, horizontal, rough, planar 76.4-76.9' - Fracture zone, gravel (limestone) various orientations, generally planar to undulating, rough to smooth, loose		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5'; clasts up to 3/8" in length; medium gray (N5), mild reaction to HCI, rounded clasts. 76.5-77.3' - medium dark gray, (N4), very fine grained, moderate HCI reaction, medium strong (R3), trace fossil casts/molds, zones of thinly laminated limestone with <1.0% voids grading to zones with voids up to 10-15%; cavities rare, generally <3/8" in diameter.	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface - Start on 6/6/07, water approx. 2.0' below ground surface -  Incipient fracture 75-75.6' -
	5 ft 62% 75.0 R8-NQ 5 ft		10 NR 2 >10	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight 75.85' - Bedding plane, horizontal to 70 deg, rough, planar, loose 76.3' - Bedding plane, horizontal, rough, planar 76.4-76.9' - Fracture zone, gravel (limestone) various orientations, generally planar to undulating, rough to smooth, loose 77.3' - Bedding plane, rough, undulating to		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5'; clasts up to 3/8" in length; medium gray (N5), mild reaction to HCI, rounded clasts. 76.5-77.3' - medium dark gray, (N4), very fine grained, moderate HCI reaction, medium strong (R3), trace fossil casts/molds, zones of thinly laminated limestone with <1.0% voids grading to zones with voids up to 10-15%; cavities rare, generally <3/8" in diameter. 77.3-78.2' - Same as 75.0-76.5'	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface Start on 6/6/07, water approx. 2.0' below ground surface -  Start on 6/6/07, water approx. 2.0' below ground surface -
-32.8 - - - - - - -	5 ft 62% 75.0 R8-NQ 5 ft 64%		10 NR 2 >10 3 1	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight 75.85' - Bedding plane, horizontal to 70 deg, rough, planar, loose 76.3' - Bedding plane, horizontal, rough, planar 76.4-76.9' - Fracture zone, gravel (limestone) various orientations, generally planar to undulating, rough to smooth, loose		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5'; clasts up to 3/8" in length; medium gray (N5), mild reaction to HCI, rounded clasts. 76.5-77.3' - medium dark gray, (N4), very fine grained, moderate HCI reaction, medium strong (R3), trace fossil casts/molds, zones of thinly laminated limestone with <1.0% voids grading to zones with voids up to 10-15%; cavities rare, generally <3/8" in diameter.	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface - Start on 6/6/07, water approx. 2.0' below ground surface -  Incipient fracture 75-75.6' -
-32.8 - - - - - - -	5 ft 62% 75.0 R8-NQ 5 ft		10 NR 2 >10 3 1	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight 75.85' - Bedding plane, horizontal to 70 deg, rough, planar, loose 76.3' - Bedding plane, horizontal, rough, planar 76.4-76.9' - Fracture zone, gravel (limestone) various orientations, generally planar to undulating, rough to smooth, loose 77.3' - Bedding plane, rough, undulating to		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5'; clasts up to 3/8" in length; medium gray (N5), mild reaction to HCI, rounded clasts. 76.5-77.3' - medium dark gray, (N4), very fine grained, moderate HCI reaction, medium strong (R3), trace fossil casts/molds, zones of thinly laminated limestone with <1.0% voids grading to zones with voids up to 10-15%; cavities rare, generally <3/8" in diameter. 77.3-78.2' - Same as 75.0-76.5'	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface - Start on 6/6/07, water approx. 2.0' below ground surface -  Incipient fracture 75-75.6' -
-32.8 - - - - - - -	5 ft 62% 75.0 R8-NQ 5 ft 64%		10 NR 2 >10 3 1	71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose 72.73-73.1' - Fracture zone, horizontal to >80 deg, rough, undulating, loose, with horizontal fracture at 72.9' which propagates ½ diameter of core 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight 75.85' - Bedding plane, horizontal to 70 deg, rough, planar, loose 76.3' - Bedding plane, horizontal, rough, planar 76.4-76.9' - Fracture zone, gravel (limestone) various orientations, generally planar to undulating, rough to smooth, loose 77.3' - Bedding plane, rough, undulating to		voids up to 1/16" over 15-20% of surface and occasional cavities, some thin black organic laminae (e.g. at 72.25'), fine to very fine grained.  No Recovery 73.1-75.0'  Limestone  75.0-76.5' - Same as 70.0-73.1' except with lithoclasts from 76.3-76.5'; clasts up to 3/8" in length; medium gray (N5), mild reaction to HCI, rounded clasts. 76.5-77.3' - medium dark gray, (N4), very fine grained, moderate HCI reaction, medium strong (R3), trace fossil casts/molds, zones of thinly laminated limestone with <1.0% voids grading to zones with voids up to 10-15%; cavities rare, generally <3/8" in diameter. 77.3-78.2' - Same as 75.0-76.5'	Driller's Remark: 71.5-72.0' soft -  Driller's Remark: 73.0-74.5' very soft -  R7: 4 minutes -  End on 6/5/07, water approx. 2.0' below ground surface - Start on 6/6/07, water approx. 2.0' below ground surface -  Incipient fracture 75-75.6' -



PROJECT NUMBER:

338884.FL

B-13

SHEET 5 OF 8

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723995.1 N, 457903.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

				TENT . CIVIE 550 S/N 180075, Midd Totally, NQ tools, NVV	<u> </u>		ORIENTATION : Vertical
WATER	LEVELS : 2.0	ft bgs	s on 6	/05/07 START : 6/5/2007 END : 6/	6/2007	LOGGER : R. McComb	
> ^ ~				DISCONTINUITIES	ڻ ا	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표원한	NA'R	(%	嚴당		1 2 1	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
Ħ,Υ E,Υ E,Υ E,Υ E,Υ E,Υ E,Υ E,Υ E,Υ E,Υ E	H F S	(%) <sub>Q</sub>	FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BO	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
P. E. E.	E E E	S O	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	≥	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	0716	íĽ.	ша		S		
-37.8			0	77.78' - Bedding plane, <5 deg, rough to	$\vdash$	Limestone	
			U	smooth, loose 77.9' - Bedding plane, <5 deg, rough, loose	Ш	<ul> <li>80.0-81.2' - fine grained, moderate to strong HCl reaction, medium strong</li> </ul>	
-				78.05' - Fracture, 60 deg, rough, planar		R3), trace fossils becoming more	-
-			3	81.2-81.3' - Fracture zone, <5 deg, rough,		common with depth (molds/casts),	Drillarda Damarki 04 E 00 El
				undulating, tight with 0.05' black	Н	_   voids grading from 10% to 20% with	Driller's Remark: 81.5-82.5' soft
	R9-NQ			carbonaceous (organic) clay lining, soft, wet		depth, cavities becoming more	3011
_	5 ft	82	0	81.6' - Bedding plane, horizontal to <5 deg, smooth, stepped to planar, loose	Ш	common with depth up to 3/8"x3/8".	1
_	96%			81.9' - Bedding plane, <5 deg, rough,	+	Clay (CL) 81.2-81.3' - black, wet, soft, rapid	-
_			0	undulating, loose	$\vdash$	- dilatancy, (carbonaceous, organic	SC-3 collected at 83.35-
				3,		layer)	84.40'
					Н	Limestone	R9: 6 minutes
			0	-	ᆸ	81.3-81.9' - pale yellowish brown,	-
-42.8	85.0		NR		$\Box$	(10YR 6/7), fine grained, mild HCI	
-42.0			0		H	reaction, becoming thinly laminated with depth and variegated (mottled),	
						voids (15-20%) decreasing with	
-				•	ш	depth.	1
-			0		+ + +	- 81.9-84.8' - Same as 80.0-81.2'	1
_						except cavities up to 1" in diameter.	_
	R10-	71	0		Ш	No Recovery 84.8-85.0'	
	5 ft 80%	/ 1	U		hd	<ul> <li>Limestone 85.0-87.55' - Same as 81.9-84.8'</li> </ul>	7
_				88.0' - Bedding plane or mechanical break,		87.55-89.0' - yellowish gray, (5Y 7/2),	Driller's Remark: 100%
_			10	horizontal, rough, undulating, loose	H	<ul> <li>mild HCl reaction, medium strong</li> </ul>	loss of water -
_				88.55-88.75' - Fracture zone, horizontal,	Ш	(R3), fine grained with some medium	Driller's Remark: 88.5-89.5'
			ND	rough, undulating, gravel sized fragments,		to coarse grained interclasts,	soft
90	90.0		NR	loose	Н	<ul> <li>fossiliferous, (casts/molds) very common, cavities up to 1" in</li> </ul>	R10: 7 minutes -
-47. <del>8</del>	90.0			90.0-90.35' - Fracture zone, limestone rock	ш	diameter, some cavities filled with	_
_			>10	fragments, various orientations	+	<ul> <li>black organic material, voids and</li> </ul>	-
_				90.35' - Fracture, horizontal, smooth, planar	廾廿	cavities over 40-50% of surface.	
				to undulating, loose		No Recovery 89.0-90.0' Limestone	
			1	90.5' - Bedding plane or mechanical break, horizontal, rough, undulating/stepped, loose		-	1
_	R11-NQ			91.4' - Bedding plane, horizontal to 50 deg,	ш	91.4-91.7' - white to very light gray,	Driller's Remark: 5% water
_	5 ft	53	1	rough, undulating, loose	+	- (N9 to N8), very fine grained, strong	returns -
	77%			92.07' - Bedding plane or mechanical break,	Щ	HCI reaction, extremely weak (R0),	
			0	10 deg, smooth, planar, tight	Щ	voids over 3%-5%, clayey.	SC-4 collected at 92.0- 92.87'
1 -			١	•	Ш	-   Silty Clay (CL-ML) 91.7-91.85' - white, (N9), moist, soft,	]
-					<b>Y</b> ///	no to slow dilatancy, cohesive.	R11: 9 minutes
-			NR		<b>V///</b>	Limestone	-
95	95.0					91.85-92.3' - Same as 91.4-91.7'	
-52.8				95.17' - Fracture, >80 deg, rough, stepped,	Щ	except gradational with unit below.	]
-			5	loose	╂┯╂	92.3-93.8' - white to very light gray,	1
1 -				95.4, 95.6, 95.72, 95.9' - Fractures (4),	口	(N9 to N8), very fine grained, strong HCl reaction, medium strong (R3),	-
-			10	horizontal to 30 deg, rough, planar to	₽₽	fossils rare to absent, voids <1/16"	]
				undulating, loose to tight 96.0' - Fracture, horizontal to <10 deg, rough,	Н	over 1%-3%, rare cavities (3/8" x	]
1 7	R12-NQ			planar, loose	Ш	3/8") with dark stain.	Driller's Remark: Medium
-	5 ft	26	10	96.2-96.75' - Fracture zone, 70 to 80 deg,	╂┴╂	Clay (CL)	hard run -
-	95%			rough, undulating, loose		_ 93.8-93.85' - dark brown, dry, no	] -
1 _			3	97.0' - Fracture, horizontal, smooth,	口	dilatancy, strong HCl reaction, friable.	
			١	undulating, loose 97.05-97.5' - Fracture zone, vertical to 0 deg.	$\vdash \vdash \vdash$	No Recovery 93.85-95.0'	]
1 7			4	97.05-97.5° - Fracture zone, vertical to 0 deg, rough, loose	Ш		R12: 7 minutes
			1	100301, 10000	╂┼┦	-	1
100	100.0				₽₩		
							]



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-13	SHEET	6	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723995.1 N, 457903.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS: 2.0	ft bgs	s on 6/	05/07 START : 6/5/2007 END : 6/	6/200	7 LOGGER : R. McComb	
≥0£	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-57.8 - - - - - - -	R13-NQ 5 ft 100% 105.0	34	10 1 >10 10 NR	97.6, 97.9' - Fractures (2), horizontal, rough, planar, loose 98.0' - Fracture, 40 to 50 deg, rough, planar, loose 98.2, 98.4' - Fractures (2), horizontal, rough, undulating to stepped, loose 99.05' - Fracture, <10 deg, rough, stepped, loose 100.25, 100.35, 100.6' - Bedding plane or mechanical break (3), <5 deg, rough to smooth, undulating 100.6-100.95' - Fracture, 70 to 80 deg, smooth, undulating, tight 101.1-101.57' - Fracture zone, horizontal to >80 deg, producing fine gravel limestone rock fragments 102.35' - Fracture or mechanical break, horizontal, rough, stepped, tight 103.2-103.6' - Fracture zone, vertical to <5 deg, rough, undulating to stepped, loose to		Limestone 95.0-96.0' - Same as 92.3-93.8' except with voids becoming more common (up to 5-10%) with depth. 96.0-99.75' - light gray, (N8), very fine to fine grained, strong HCI reaction, weak (R2), fossiliferous (casts/molds) common, possible intraclasts, gastropod casts and molds common, voids and cavities over 40%-50% of rock surface. No Recovery 99.75-100.0' Limestone 100.0-105.0' - Same as 96.0-99.75' except fossils become less common along with voids and cavities; cavities and voids common from 100.0'-100.9' and from 102.2'-103.0', intervals in between consist of very fine grained limestone, with void and	R13: 7 minutes  Suspect siliceous unconsolidated sand 105 - 107.5'
- - - - - 110_	R14-NQ 5 ft 50%	16	0 >10	108.35-109.0' - Fracture zone, vertical and horizontal planes, tight 109.5-109.6' - Fracture zone, horizontal to >80 deg		No Recovery 10%-15% of surface.  No Recovery 105.0-107.5'  Poorly Graded Sand (SP)  107.5-108.35' - moderate yellowish brown, (10YR 5/4), wet, loose, fine grained, moderately cohesive, moderate to well sorted, subangular to subrounded, trace to 5% heavy dark minerals, sharp contact with underlying limestone, sand is	R14: 8 minutes
-67.8 - - - - - - -	R15-NQ 5 ft 74%	0	5 9 10	110.1, 110.38, 110.58, 110.63, 110.78, 111.02, 111.05, 111.2, 111.35, 111.4, 111.5, 111.7, 111.75, 111.8, 112.15, 112.28, 112.4, 112.5, 112.55, 112.62, 112.9, 113.1, 113.15, 113.2, 113.25, 113.5' - Bedding plane or mechanical break (26), horizontal, rough, planar to undulating, and loose, vertical fractures between horizontal discontinuities at 111.35-111.5' and 112.9-113.25'		Limestone 108.35-110.0' - light gray to white, (N9 to N8), fine to very fine grained, very strong HCl reaction, very weak to weak (R1 to R2), with extremely weak (R0) zone from 109.5'-109.6' containing some clay, fossiliferous (very small echinoids) and other fossils, voids and cavities over 5%-10% with percentage increasing with depth.	R15: 4 minutes
-115 -72.8 	115.0 R16-NQ 5 ft 1 57%	10	5 10 NR	115.15, 115.3, 115.36, 115.65, 115.9, 116.1, 116.25, 116.3, 116.4, 116.47' - Bedding plane (10), horizontal, rough, planar to slightly undulating, tight  118.5' - Bedding plane, <5 deg, rough, undulating, loose		110.0-113.7' - yellowish gray, (5Y 7/2), very fine grained, very strong HCl reaction, very weak to weak (R1 to R2), fossils rare, voids generally less than 3/16" over 1%-2% of rock, occasional cavity (worm burrow), 3/8 x 3/8", matrix very "chalk-like". No Recovery 113.7-115.0' Limestone 115.0-116.5' - Same as 110.0-113.7' No Recovery 116.5-118.5'	Driller's Remark: 117.5- 118.5' Suspect sand bed, barrel plugged up, no circulation, tried to stop pump, barrel stalled, also evidenced by decreasing core diameter suggesting abrasion by sand
120	120.0		4	119.17, 119.32, 119.6, 119.8' - Bedding plane (4), smooth to rough, planar to slightly undulating, loose		_	R16: 6 minutes



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-13 SHEET 7 OF 8

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723995.1 N, 457903.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS : 2.0	ft bgs	on 6/	05/07 START: 6/5/2007 END: 6/	6/200	LOGGER : R. McComb	
≷D≎	(%)			DISCONTINUITIES	90	LITHOLOGY	COMMENTS
ELO NO E	ANC RY (3)		ZES IT	DESCRIPTION	O LC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-77.8 - -			4	120.1, 120.3, 120.47, 120.8, 121.04, 121.57, 121.78, 122.2, 122.37, 122.62, 123.21, 123.3, 123.36, 123.55, 123.8' - Bedding plane or mechanical break (15), horizontal to <5 deg,		Limestone  - 118.5-120.0' - yellowish gray, (5Y 7/2), fine to very fine grained, strong HCI reaction, weak (R2), fossiliferous	-
-	R17-NQ	32	3	rough, planar to undulating, loose		<ul> <li>with numerous casts/molds (gastropods, pelecypods, echinoids); cavities and voids over 20%-30% of surface.</li> </ul>	-
-	5 ft 78%	32	5	122.44' - Bedding plane, horizontal, smooth, within thin laminae, loose	120.0-120.6' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, weak (R2), fossiliferous	_	
- 125	125.0		NR			(casts/molds) unfilled burrowed cavities/voids over 70%-80%, cavities up to 3/8" x 3/8". 120.6-123.2' - yellowish gray, (5Y	R17: 7 minutes
-82. <del>8</del> -	.20.0		7	125.05, 125.1, 125.22, 125.27, 125.55, 125.7, 125.97, 126.25, 126.43, 126.52, 126.55, 126.7, 126.85, 126.97, 127.1, 127.32, 127.35,		7/2), fine to very fine grained, strong  HCl reaction, very weak to weak (R1 to R2), fossils rare, voids and cavities rare, some mottling, very	
-	R18-NQ		7	127.5, 127.82, 127.92, 128.0, 128.1, 128.14, 128.2, 128.25, 128.32, 128.37, 128.42, 128.48, 128.55, 128.67, 128.78, 128.9' Bedding plane or mechanical break (33),		thinly laminated from 122.4 to 122.6'. 123.2-123.9' - Same as 120.0-120.6' <b>No Recovery 123.9-125.0'</b>	-
-	5 ft 81%	0	10	horizontal, rough to smooth, planar to undulating, generally loose; at 126.7' black carbonaceous coating on 40% of surface,		Limestone 125.0-129.05' - Same as 120.6-123.2' except laminations absent.	-
_			>10	fracture zone 127.35-127.5'	Ħ	1	
130 -87.8	130.0		\10 / NR	128.97, 128.99' - Bedding plane or mechanical break (2), horizontal, rough to smooth, planar to undulating, generally loose	Ħ	No Recovery 129.05-130.0'	R18: 5 minutes
-07.0			4	130.35, 130.54, 130.75, 130.85, 131.05, 131.17, 131.25, 131.39, 131.5, 131.67, 131.71, 131.85, 131.99, 132.32, 132.85' -		<ul> <li>130.0-131.3' - yellowish gray, (5Y 7/2), fine to medium grained, strong</li> <li>HCl reaction, very weak to weak (R1</li> </ul>	-
-	R19-NQ		9	Bedding plane or mechanical break (15), horizontal to <5 deg, smooth to rough, planar to undulating, loose		<ul> <li>to R2), fossiliferous with numerous casts/molds, echinoids, gastropods, cavities and voids up to 40%</li> </ul>	-
-	5 ft 84%	24	2	133.0-133.3' - Fracture, 80 deg, rough,	F	<ul> <li>increasing in depth, some intraclasts present.</li> <li>131.3-132.0' - yellowish gray, (5Y</li> <li>7/2), very fine to fine grained, strong</li> </ul>	- -
-			3	undulating, loose 133.5' - Fracture, horizontal to 80 deg, rough, stepped, loose		HCI reaction, "grainy" appearance, thinly laminated, voids and cavities rare.	R19: 4 minutes
135_ -92.8 -	135.0		NR >10	— 135.2-135.9' - Fracture zone, horizontal to 90 deg, smooth to rough, undulating to planar,		132.0-133.6' - Same as 130.0-131.3' except very weak (R1), medium to coarse grained (coarse particularly at	_
- -			7	loose 136.06, 136.13, 136.24, 136.42, 136.8, 136.93, 136.97, 137.2' - Bedding plane or		132.0' to 132.3'), similar to coquina, very fossiliferous. 133.6-134.2' - Same as 131.3-132.0'	- -
-	R20-NQ - 5 ft 44%		_1_	mechanical break (8), horizontal, rough to smooth, undulating to planar, loose		except very thinly laminated, voids/cavities rare to absent. No Recovery 134.2-135.0' Limestone	-
-			NR			135.0-135.2' - Same as 131.3-132.0' 135.2-137.03' - Same as 130.0-131.3' except fine grained, very weak (R1), fossiliferous, very thinly laminated at base with	R20: 4 minutes
140	140.0					organics.	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-13	SHEET	8	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723995.1 N, 457903.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING	METHODA	ND E	JUIPIV	IENT: CME 550 S/N 186073, mud rotary, NQ tools, NV	v casii	<u>ıg</u>	ORIENTATION : Vertical
WATER	LEVELS : 2.0	ft bg	s on 6	05/07 START: 6/5/2007 END: 0	6/6/200	D7 LOGGER : R. McComb	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		SII.	DESCRIPTION	- SO	ROCK TYPE, COLOR,	OUTE AND DEDTH OF GARNING
ᆱᇬ	RUH A.A.	(%) Q	URE	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	<b>- 1</b> 을	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
FYF.	NG CO	αD	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND	SYMBOLIC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	BR LE PRE	R (	FF	THICKNESS, SURFACE STAINING, AND TIGHTNESS	λS	CHARACTERISTICS	Divor 9, TEST NESOCTS, ETC.
-97.8					Ш	137.03-137.2' - medium gray, (N5),	
			4	140.4, 140.45, 140.62, 140.76, 141.02, 141.1' - Bedding plane or mechanical break (6),	T	<ul> <li>very fine grained, strong HCl</li> <li>reaction, weak to medium strong (R2</li> </ul>	<u> </u>
-			10	horizontal, smooth, planar, loose	$\perp$	to R3), few voids.	· -
_			10	141.25-141.6' - Fracture zone, various orientations, limestone gravel	F	- No Recovery 137.2-140.0' Limestone	
_	R21-NC			141.7, 141.85, 142.0, 142.25, 143.0, 143.15,	#	140.0-141.3' - yellowish gray, (5Y	-
_	5 ft 89%	31	2	143.2, 143.28' - Mechanical break or	+	<ul> <li>7/2), fine grained, strong HCI reaction, very weak to weak (R1 to</li> </ul>	-
-	0070			fractures (8), horizontal to 60 deg, rough, stepped, tight	+	R2), fossils rare to absent;	-
-			5		廿	<ul> <li>"chalk-like" texture, cavity infilling or supported by interclasts in fine</li> </ul>	-
-			>10	144.0-144.45' - Fracture zone, limestone	+	grained matrix, grains up to 3/16" in	R21: 6 minutes
	4.50		NR	gravels, orientations unknown	+	<ul> <li>diameter and dark gray and white (N9) in color, voids &lt;1%.</li> </ul>	-
145_ -102.8	145.0			145.1' - Fracture, horizontal, smooth,	士	141.3-144.5' - yellowish gray, (5Y	<del></del>
-			10	undulating, loose		7/2), very fine grained, strong HCl reaction, weak to medium strong (R2	-
-				145.2' - Fracture, 60 deg, smooth, stepped,	+	to R3), bioturbated with some	-
-			>10	tight 145.6-145.88' - Fracture zone, 85-90 deg	$+\Box$	cavities >1" long and >1" deep, some	-
-	R22-NC			along outside 1/5th of core, truncated at	$-\Box$	cavities infilled, some cavities lined with dark gray (N3) coatings, mottled	-
-	5 ft	0	1	145.88', split at 157.7' by <5 deg fracture 145.93' - Fracture, horizontal, smooth,	+	texture with area of void-free	-
_	58%			undulating, loose	+	limestone and zones of limestone with up to 60%-70% voids.	-
_				146.05-146.45' - Fracture zone, vertical, rough, planar, tight, cross cut by horizontal		fossiliferous in casts/molds of	-
_			NR	fracture at 146.15' which propagates halfway	$\perp$	pelecypods and gastropods.  No Recovery 144.5-145.0'	-
_				through core 146.45-146.7' - Fracture zone	$\perp$	Limestone	R22: 7 minutes
150_	150.0			_ 146.7' - Fracture, <5 deg, rough, undulating,	上	145.0-146.15' - yellowish gray, (5Y 7/2), very fine grained, strong HCl	
-107.8 -				∖ loose ∖ 146.85, 146.95, 147.05' - Bedding plane or	/ ]	reaction, weak to medium strong (R2	
_				mechanical break (3), horizontal to <5 deg,		to R3), thinly laminated, fossils rare to absent, some voids up to 1/16" or	_
				rough, undulating to stepped, loose	1	less over 1%-3% of rock, cavities	_
						rare (3/8"x3/8"), sharp contact with underlying limestone.	_
						146.15-147.9' - yellowish gray, (5Y	_
						7/2), fine to medium grained, strong HCl reaction, weak (R2), very friable	
					1	and loose (especially at 146.4' to	·
-					1	146.7'), with extremely weak (R0)	
_					1	rock at 146.4'-146.7', trace fossils, voids generally less than 1/16" over	<u> </u>
-					1	60%-70% producing a grainy texture.	<u> </u>
1 -					1	No Recovery 147.9-150.0'  Bottom of Boring at 150.0 ft bgs on	_
1 -					1	6/6/2007	-
1 -					1	<u> </u>	-
1 -					1	<u> </u>	-
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-					1	ŀ	-
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-14	SHEET	1 OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724122.8 N, 458024.1 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

						iary, auto naminer, Avvo rous			ONIENTATION : Vertical
WATER	LEVELS	: 7.0 ft b	gs on 6/5/	/07 S	START : 6/5/2007	END : 6/6/2007	LOGGE	R : B.	Ellis, D. Thomas
300				STANDARD PENETRATION		SOIL DESCRIPTION		ď	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	COUL NIAME	LICOC ODOLID OVMDOL	00L0B	SYMBOLIC LOG	DEDTIL OF CACINIC DRILLING DATE
		RECOVE	ERY (ft)			E, USCS GROUP SYMBOL, CONTENT. RELATIVE DEN		Ö	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
THE STATE OF THE S			#TYPE	6"-6"-6"		CY, SOIL STRUCTURE, MIN		₩	INSTRUMENTATION
				(N)					
41.7	0.0				Topsoil	h black to black, (N2 to N	1) moiet /	7.7	
		0.8	SS-1	1-1-4 (5)		nd roots, wood chips	1), 1110131,	914	
-	1.5			(0)	Poorly Graded	Sand With Silt (SP-SM)		1	Start SPT at 08:15, 6/5/07
-					0.3-0.75' - yellov	wish gray, (5Y 7/2), moist,	, loose, very	1	1
-					depth. 5% nonp	ned, trace organics decrea plastic fines, sand is silica	asing with	1	-
-					(			1	-
-								4	-
_								4	_
_								1	_
_								_	_
5	5.0								
36.7					Sandy Fat Clay		modium /		
1 -		1.1	SS-2	3-4-6 (10)		ish gray, (5GY 6/1), moist, high plasticity, slow dilata		1	]
-	6.5			(10)		grained silica sand		7111	1
-	0.5				Silt (ML)	II ' 1 (40)/D 0	(0)	1	-
-					nonplastic very	vellowish orange, (10YR 6/ v rapid dilatancy, moderate	(6), wet, stiff,	1	Possible water table encountered at 7'
-					reaction, trace v	very fine grained sand, all		-	-
-					material			4	-
_								4	_
l _								1	_
_								_	
10	10.0								
31.7					Sandy Silt (ML)			ТШ	]
-		1.3	SS-3	5-5-2		k yellowish orange, (10YR rapid dilatancy, moderate		1111	1
-	11.5			(7)	reaction, 25-30%	% fine to medium grained	sand, all	1111	<u>-</u>
-	11.5				\carbonate mate	erial	/	1	-
-								-	Driller's Remark: Lost circulation at 12'
-								4	Driller's Remark: Hard formation -
-								4	Driller's Remark: Chatter throughout run from 10-15'
_								4	Driller's Remark: Soft drilling at 12.5'
l _								1	Driller's Remark: Circulation loss at 13', hard
1				ĺ				]	drilling
15	15.0								
26.7					Sandy Silt (ML)	)			4-inch casing set at 15'
-		1.5	SS-4	16-3-19	15.0-15.5' - San Limestone Frag	ne as 10.0-11.3'	/	Ш	1
-	16.5			(22)		gments yish orange, (10YR 7/4), n	nild to	+	-
-	10.5				¬ moderate HČI re	eaction, coarse sand-size	to coarse /	Ť	-
-					\gravel-size lime	estone fragments, fossilifer	rous /	1	-
-								-	-
-								-	-
-								4	_
_								1	_
l _								1	
20									



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	R-14	SHEET	2 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724122.8 N, 458024.1 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 7.0 ft bo	gs on 6/5/	′07 S	START : 6/5/2007 END : 6/6/2007 LOGGEF	R : B.	Ellis, D. Thomas	
				STANDARD	SOIL DESCRIPTION		COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLIC LOG		
		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
THE AVE			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	ΥMΒ	INSTRUMENTATION	
31.7	20.0			(N)	Limeatona Francosta	Ś	Advanced 4 inch (LIM) engine to 00!	
21.7	20.0	1.4	SS-5	23-33-50/5.5	Limestone Fragments 20.0-21.4' - Same as 15.5-16.5'	H	Advanced 4-inch (HW) casing to 20', decision made to begin rock coring	
-	21.5			(83/11.5")		屵	<u> </u>	
-					Begin Rock Coring at 21.0 ft bgs See the next sheet for the rock core log		_	
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-14

SHEET 3 OF 9

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724122.8 N, 458024.1 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

00111110		10	<u> </u>	PIENT . CIVIE 330X 3/N 340233, Hidd Totally, Fig tools, Fiv		· <del>9</del>	ORIENTATION : Vertical
WATER	LEVELS: 7.0	ft bgs	s on 6	/5/07 START : 6/5/2007 END : 6/	6/2007	LOGGER : B. Ellis, D. Thomas	
	_			DISCONTINUITIES	(7)	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
필칠이	N.¥.E	9	E L		윽	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
Ε₩₩	HESS I	(%) Q	달	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	<u>8</u>	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
989	RNN	Ø	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ž	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
Оωш		œ	шД		S		
	21.0			21.0-21.3' - Fracture zone, fine to coarse	Ш	Limestone	Cavities at 21.6', 21.9',
I -			4	grained subangular gravel 21.3' - Fracture, 10 deg, rough, planar	Ш	<ul> <li>21.0-21.3' - grayish orange, (10YR 7/4), mild to moderate HCl reaction</li> </ul>	22.6'
-				21.3 - Fracture, 10 deg, rough, planar		21.3-23.0' - dusky yellow, (5Y 6/4),	-
l -			1 1	,	╀┼┤	- mild to moderate HCl reaction, weak	1
					Ш	to medium strong (R2 to R3), voids	
I -	R1-HQ		3	23.0' - Fracture, 10 deg, rough, stepped,		(<1/16") over 25% of rock surface,	1
-	5 ft	35		loose	₩	- numerous elongate to platy	-
-	48%			23.0-23.1' - Fracture zone	$+ \Box$	cavities/molds from 1/4" up to 3/4" long, trace inorganic inclusions	-
<u> </u>					Д	- 23.0-23.4' - grayish orange, (10YR	_
25			NR		Н	7/4), strong HCl reaction, very weak	
16.7				_	TTI	(R1), voids (1/16") over 20% of rock	R1: Run time not reported
-					口	- surface, numerous fossil	-
I -	26.0				╂┼┨	cavities/molds 1" in diameter or	1 4
						⁻ larger ₋ <b>No Recovery 23.4-26.0'</b>	
I -			1	26.7' - Fracture or mechanical break.	$\Box$	Limestone	Cavity at 28.65'
-				horizontal, smooth, planar	╁┼┼	26.0-26.7' - dusky yellow, (5Y 6/4),	Cavity at 20.05
-			1	nonzontal, smooth, planal	ш	fine grained, strong HCl reaction,	-
_				27.7' - Fracture, 35 deg, rough, undulating,	Щ	very weak (R1)	_
	R2-HQ			(almost smooth)	Н	26.7-29.2' - dusky yellow to medium yellowish brown, (5Y 6/4 to 10YR	7
-	5 ft	40	2	28.0' - Fracture, horizontal, rough, undulating	ш	5/4), fine grained, moderate HCl	-
-	64%		1	28.6' - Fracture or mechanical break, horizontal, smooth, planar	+	reaction, weak to medium strong (R2	-
_			$\vdash$	29.05' - Fracture, 30 deg, smooth, planar	Н	to R3), voids (1/16") over 5-25% of	_
30				25.05 - Fracture, 50 deg, smooth, planar		rock surface, some 1/4" round	
11.7			NR	_	11	— cavities	R2: 3 minutes
-					╁┼┧	No Recovery 29.2-31.0'	1
-	31.0				Ш		_
			1		┸	Limestone - 31.0-33.1' - moderate yellowish	
			'		H	brown, (10YR 5/4), fine grained,	1
-				31.9' - Fracture, 10 deg, smooth, planar	Ш	moderate HCl reaction, weak to	-
-			2	32.2' - Fracture, 45 deg, smooth, undulating	+	<ul> <li>strong (R2 to R4), voids (1/16") over</li> </ul>	-
_				32.7' - Fracture, vertical, rough, undulating	lacksquare	_ 10% of rock surface, few elongate	_
	R3-HQ			33.0-33.85' - Fracture zone, fine- to	Ш	cavities up to 1/4", transitions from	
_	5 ft 84%	40	3	coarse-grained gravel	╁┼┼	<ul> <li>strong to weak rock with depth, accompanied by increase to voids</li> </ul>	1
-	O <del>-1</del> /0			33.9' - Fracture, 70 deg, rough, undulating		over 20% of rock surface	-
-			2	34.2' - Fracture, 10 deg, rough, planar	ДП	- 33.1-33.6' - Same as 31.0-33.1' lower	1 4
35				34.8' - Fracture, 80 deg, rough, undulating —	┟┼┤	portion except weak (R2)	
6.7			0	57.5 - Fracture, oo deg, rough, undulating —		33.6-35.2' - Same as 31.0-33.1'	R3: 3 minutes
1 -	000		NR		┧┴┦	<ul> <li>upper portion except strong (R4), 10% voids</li> </ul>	1
-	36.0				╂┼┨	No Recovery 35.2-36.0'	-
I -			2	26 4' Fracture 60 des rough undulation		Limestone	]
			-	36.4' - Fracture, 60 deg, rough, undulating	Ш	36.0-36.8' - moderate yellowish	
_				36.8, 37.1' - Fractures (2), horizontal, smooth, planar	11	brown, (10YR 5/4), fine grained,	1
-			2	37.45' - Fracture, 70 deg, rough, undulating		moderate HCl reaction, medium	Cavities at 37.2', 38.0'
-					╀┼┤	strong (R3), voids (1/16") over 10-20% of rock surface, few elongate	1
	R4-HQ	45	2	38.0' - Fracture, 10 deg, smooth, undulating	┟┼┨	cavities up to 1/4"	
I -	5 ft 74%	40			口	36.8-37.4' - Same as 36.0-36.8'	1
1 -	. 470			38.8, 39.3' - Fractures (2), horizontal,	╁┼┼	except extremely weak to weak (R0	1 1
-			1	smooth, planar	╂┼╂	_ to R2)	1 -
40				_	口	37.4-38.8' - Same as 36.0-36.8'	
1.7			NR		Ш	except medium strong (R3) 38.8-39.3' - Same as 36.8-37.4'	R4: 2 minutes
I -	44.0		' '		╂┼╂	_ 00.0-00.0 - 0aine as 00.0-07.4	1 -
	41.0				仠		+
			ı		1		



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BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724122.8 N, 458024.1 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER LEVELS: 7.0 ft bgs on 6/5/07				5/07 START : 6/5/2007 END : 6	6/2007	7 LOGGER : B. Ellis, D. Thomas			
≳O⊋				DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
H B ATIC	E RL STH, OVEI	(%) <sub>Q</sub>	ĮŠ.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD		
FPI	ORE	RO	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	×ΜΕ	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.		
ООШ	078	œ	шФ		S	39.3-39.7' - Same as 36.0-36.8'			
-			>10	41.0-41.3' - Fracture zone 41.3' - Fracture zone, 5 deg, rough, planar,		- except weak (R2)			
_				angular gravel (1/2 to 1 1/2")	Щ	No Recovery 39.7-41.0'	_		
l _			4	41.6' - Fracture zone, 20 deg, rough, planar, open	Щ	Limestone 41.0-42.2' - moderate yellowish	_		
			-	41.7' - Fracture zone, 70 deg, rough, planar,		brown, (10YR 5/4), fine grained,			
	R5-HQ	00		fracture terminates at 41.6' and 41.85', open 41.85' - Fracture zone, 30 deg, rough,		moderate HCl reaction, weak (R2), voids (1/16") over 20-25% of rock	Ī		
_	5 ft 62%	20	2	stepped, fracture with some fragmentation,		surface, elongate fossil molds up to	_		
_			0	open	$\perp$	1/5" over 5% of rock surface, few	-		
45				42.3-42.7' - Clay seam, non-indurated zone bounded by weakly indurated rock	ш	<ul> <li>cavities up to 1/4", some gray to black inclusions</li> </ul>	-		
-3.3			NR	42.9-43.15' - Clay seam, non-indurated zone	+	42.2-43.4' - Same as 41.0-42.2'	R5: 2 minutes		
-				bounded by weakly indurated rock 43.4, 43.9' - Fractures (2), horizontal, rough,	$\blacksquare$	<ul> <li>except very weak to extremely weak</li> </ul>	-		
-	46.0			undulating, open	世	(R1 to R0) 43.4-44.1' - Same as 41.0-42.2'	-		
-			1	46.4' - Fracture, 10 deg, rough, undulating,	+	No Recovery 44.1-46.0'	-		
-				open to tight	$\perp$	Limestone 46.0-49.9' - moderate yellowish	_		
_			3	47.15' - Fracture, 10 deg, smooth, planar	$\bot$	brown, (10YR 5/4), fine grained, mild	_		
l _				47.3' - Fracture, 50 deg, smooth, planar 47.4' - Fracture, 15 deg, rough, undulating	$\blacksquare$	to moderate HCl reaction, very weak	_		
_	R6-HQ 5 ft	62	1	radiale, to deg, reagin, andalating		to medium strong (R1 to R3), voids (1/16") over 20% of rock surface	_		
	78%	02	'	48.65' - Fracture, 70 deg, rough, undulating		46.4-47.45' - Same as 46.0-49.9'			
			1			except very weak (R1) 47.45-48.6' - Same as 46.0-49.9'			
50			ı	49.6' - Fracture, horizontal, smooth,	$\top$	except medium strong (R3)	1		
-8.3				undulating –	Ħ		R6: 2 minutes		
-	E1 0		NR		世	49.4-49.9' - Same as 46.0-49.9'	_		
-	51.0			51.0' - 1/4-inch infilling, strong HCl reaction	+	except medium strong (R3)	-		
-			0	<b>5</b> , <b>5</b>		No Recovery 49.9-51.0' Limestone	-		
-					$-\Box$	51.0-52.3' - moderate yellowish	-		
_			3	52.3, 52.55, 52.7' - Fractures (3), horizontal,	+	brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, medium	-		
-	D7.110			smooth, planar, open	井	<ul> <li>strong to strong (R3 to R4), voids</li> </ul>	-		
-	R7-HQ 5 ft	57	4	53.2' - Fracture, vertical, rough, planar	╨	(1/16") over 10% of rock surface,	_		
_	86%			53.3' - Fracture, 10 deg, smooth, planar 53.8, 53.9' - Fracture or fractures (2), 10 deg,		trace voids up to 1/5", trace organic inclusions	_		
_			4	rough, planar, open	Ш	52.3-52.8' - Same as 51.0-52.3'	_		
55				54.1 - Fracture, 45 deg, smooth, undulating,	$\square$	except transition with depth from — weak (R2) to extremely weak (R0)			
-13.3			_1_	tight – 54.4' - Fracture, horizontal, rough, planar to		52.8-54.75' - Same as 51.0-52.3'	R7: 2 minutes		
	56.0		NR	undulating		54.75-55.3' - Same as 52.3-52.8'	]		
				54.75' - Fracture, 10 deg, rough, stepped, open	Щ	<ul> <li>except possibly grades to stronger rock at 55.3'</li> </ul>	1		
-			1	54.9, 55.2' - Fractures (2), horizontal, rough,	$\Box$	No Recovery 55.3-56.0'	-		
-				planar, tight 56.6' - Fracture, horizontal and 45 deg,	+	<ul> <li>Limestone</li> <li>56.0-60.0' - moderate yellowish</li> </ul>	-		
-			1	rough, undulating	口	brown, (10YR 5/4), fine grained, mild	-		
-	R8-HQ			57.3' - Fracture, 10 deg, rough, stepped,		to moderate HCl reaction, medium	-		
-	5 ft	58	3	open 58.1' - Fracture, horizontal, rough, planar,	$+$ $\square$	strong to very weak (R3 to R1), voids (1/16") over 25-30% of rock surface,	-		
-	80%			open	一口	some cavities up to 1/4", organic	-		
-			3	58.5' - Fracture, 15 deg, rough, undulating 58.8' - Fracture, 35 deg, smooth, undulating,	+	inclusions; very similar to R7-HQ	-		
60				tight to open					
-18. <del>3</del>			NR	59.7-59.8' - Fracture zone, 1/2" limestone	$oldsymbol{ol}}}}}}}}}}}}}}}}}}}}}$	No Recovery 60.0-61.0'	R8: 2 minutes		
	61.0			rock fragments					



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724122.8 N, 458024.1 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

WATER	LEVELS : 7.0	ft bgs	s on 6	/5/07 START : 6/5/2007 END : 6/	6/200	7 LOGGER : B. Ellis, D. Thomas	
≥∩≘	(%)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q i	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUI	CO LEP REC	A Q	FR/ PEF	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-			0	59.8' - Fracture, high angle fracture partially penetrating core 61.4-61.6' - Fracture zone, horizontal, smooth, planar		Limestone  - 61.0-61.7' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, - very weak to extremely weak (R1 to	- - -
- - - 65	R9-HQ 5 ft 92%	75	1	63.45' - Fracture, horizontal, rough, planar 64.0-64.1' - Fracture zone 64.6' - Fracture, horizontal, smooth, planar,		R0), voids (1/16") over 3% of rock surface, few cavities up to 1/4" - 61.7-63.4' - Same as 61.0-61.7' except medium strong to strong (R3 to R4), voids (1/16") over 5-10% of rock surface 63.4-64.3' - Same as 61.0-61.7'	- - - -
-23. <del>3</del>	66.0		2 NR	open 65.35, 65.45' - Fractures (2), 10 deg, smooth, planar		64.3-65.4' - Same as 61.0-61.7' - except weak to medium strong (R2 to R3), voids (1/16") over 5% of rock surface	R9: 3 minutes
-			5	66.1, 66.15, 66.35, 66.55' - Fractures (4), horizontal, smooth, planar, tight 66.6' - Fracture, horizontal, smooth, planar, open		65.4-65.6' - dark yellowish orange,     (10YR 6/6), moderate HCl reaction,     extremely weak (R0), voids and     cavities absent	-
-	R10-HQ 5 ft	48	2	67.6' - Fracture, horizontal, smooth, planar, tight to open 67.75' - Fracture, 75 deg, smooth, undulating		No Recovery 65.6-66.0' Limestone 66.0-66.6' - dark yellowish orange, (10YR 6/6), moderate HCl reaction,	
- - 70	82%		4	68.2' - Fracture, 75 deg, rough, undulating 68.5-69.1' - Fracture zone, vertical and horizontal, smooth, undulating, angular limestone rock fragments		extremely weak to very weak (R0 to R1), voids and cavities absent 66.6-70.1' - dark yellowish brown,	-
-28. <del>3</del> -	71.0		O NR	69.1' - Fracture, 20 deg, rough, undulating 69.3' - Fracture, 20 deg, smooth, undulating, infilled with sediment 69.75-70.1' - Fracture zone, vertical, rough,		(10YR 4/2), fine grained, moderate HCl reaction, strong (R4), voids (1/16") over 5% of rock surface, voids (1/8") over 5% of rock surface	R10: 3 minutes
-			>10	undulating, open 71.0-71.2' - Fracture zone, subrounded fragments (up to 1 3/4")		No Recovery 70.1-71.0' Limestone 71.0-72.9' - moderate yellowish	- -
-	R11-HQ	38	>10 6	71.25-71.35' - Fracture zone, horizontal, smooth, planar to undulating 72.1' - Fracture, horizontal, smooth, planar, tight		brown to moderate olive brown, (10YR 5/4 to 5Y 4/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids (1/16") over	- -
-	5 ft 80%	50	2	72.3-72.5' - Fracture zone, subangular fragments up to 1/2" 72.5' - Fracture, 40 deg, rough, stepped 72.8' - Fracture, horizontal, rough, undulating		10% of rock surface, few cavities up to 1/4" 72.9-73.5' - olive gray, (5Y 3/2), fine grained, moderate HCl reaction.	Cavities at 73.9', 74.5'
75 -33.3 -	76.0		NR	73.0' - Fracture, 30 deg, rough, stepped — 73.0-73.2' - Fracture zone, angular fragments (up to 1/2")		strong to very strong (R4 to R5), voids (1/16") over 3% of rock surface 73.5-75' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to	R11: 3 minutes
-			0	73.4' - Fracture, 10 deg, rough, undulating, open 74.1' - Fracture, 10 deg, smooth, planar, tight 74.9' - Fracture, 50 deg, rough, stepped,		strong HCl reaction, strong (R4), voids (1/16") over 15% of rock surface, few cavities up to 1/4"	]
-	R12-HQ		1	open 77.6' - Fracture, horizontal, rough, planar 78.0' - Fracture, 10 deg, rough, undulating		No Recovery 75.0-76.0' Limestone 76.0-77.55' - moderate yellowish brown, (10YR 5/4), fine grained,	- -
-	5 ft 88%	45	3	78.9' - Fracture, horizontal, smooth, planar 79.15, 79.35, 79.65' - Fractures (3),	H	moderate HCl reaction, very strong (R5), voids (1/16") over 5-10% of rock surface, few cavities from 1/4" up to 3/4", some cavity infilling	
80 <u> </u>	01.0		7 NR	horizontal, rough, planar, open at 79.15' — 80.15-80.4' - Fracture zone, subangular fragments (up to 2")	H	— cap to 6.74 , some eavity initially	R12: 3 minutes
	81.0						

ORIENTATION: Vertical



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724122.8 N, 458024.1 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 7.0	ft bas	s on 6	/5/07 START : 6/5/2007 END : 6/	6/200	7 LOGGER : B. Ellis, D. Thomas	
>00	(6			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			1	81.1' - Fracture, horizontal, rough, undulating		77.5-78.9' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, extremely weak (R0), with	SC-1 collected at 81.2- 82.3'
-			0			very fine carbonate-derived sand and silt 78.9-80.4' - moderate yellowish	-
-	R13-HQ 5 ft 84%	78	0		H	brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), voids (1/16") over 25% of rock	Cavities at 83.7', 84.0', 84.1', 84.4' (less than 1/4")
85			1	84.0' - Fracture, 40 deg, rough, stepped		surface, some cavities 1/4"-1/2", trace organic inclusions No Recovery 80.4-81.0'	
-43. <del>3</del> -	86.0		NR	85.0' - Fracture, 45 deg, rough, undulating	Ħ	Limestone  - 81.0-83.15' - dark yellowish orange to dusky yellow, (10YR 6/6 to 5Y 6/4), fine grained, moderate to strong	R13: 3 minutes
-			2	86.3' - Fracture, 10 deg, rough, planar 86.6' - Fracture, 10 deg, rough, stepped	Ħ	HCI reaction, medium strong (R3), voids (1/16") over 15-20% of rock surface, few cavities up to 1/4"	-
-	544110		>10	87.1-87.5' - Fracture zone, angular fragments (3/4 to 2")	F	83.15-85.2' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2),	-
-	R14-HQ 5 ft 90%	20	3	88.0' - Fracture, 30 deg, rough, undulating, tight 88.65' - Fracture, 40 deg, rough, undulating,		voids (1/16") over 25-30% of rock surface with cavities up to 3/4", some cavities infilled with less strong, gray	-
90_ -48.3			>10	open 88.85' - Fracture, vertical, rough, undulating, tight 89.1' - Fracture, horizontal, rough, stepped,	Ħ	to brown, limestone No Recovery 85.2-86.0' Limestone	- R14: 4 minutes
-40.5	91.0		2 NR	open 89.2-89.4' - Fracture zone, angular fragments (1/2 to 1"), terminated by rough-planar		86.0-87.5' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction, extremely weak (R0), voids (1/16")	
-			>10	horizontal fracture  89.7' - Fracture, 10 deg, rough, undulating to stepped, tight to open		over up to 3% of rock surface 87.5-88.7' - moderate yellowish brown, (10YR 5/4), strong HCl	- Core barrel getting stuck in
-	R15-HQ			90.0' - Fracture, 80 deg, rough, undulating, tight to open 90.3' - Fracture, horizontal, rough, planar,	H	reaction, weak to medium strong (R2 to R3), voids (1/16"-1/8") over 20% of rock surface, few cavities 1/2"-3/4",	bore barrel getting stack in borehole, some casing withdrawn in order to retrieve core barrel
-	5 ft 18%	0	NR	tight 91.0-91.6' - Fracture zone, angular to subrounded fragments 1/2" to 2"		cavities mostly elongate  88.7-90.5' - yellowish gray, (5Y 8/1),  fine to very fine grained, strong HCl	-
95 <u> </u>				91.6' - Fracture, 30 deg, rough, undulating, open	H	reaction, very weak to very strong (R1 to R5), fossiliferous (less than – 1/16"), rock strength gradually transitions from weak (R2) at	- R15: 18 minutes
-	96.0		0			88.7-89.1' to extremely weak (R0) at 89.1-89.7' to strong to very strong (R4 to R5) at 89.7-90.5'	
-						No Recovery 90.5-91.0'  Limestone 91.0-91.6' - moderate yellowish	]
-	R16-HQ					brown to light olive gray, (10YR 5/4 to 5Y 5/2), angular to subangular limestone rock fragments (1/2"-2"),	]
-	5 ft 4%	0	NR			no fines 91.6-91.9' - Same as 88.7-90.5' except yellowish gray, (5Y 8/1)	]
100 -58.3				_	Ë	No Recovery 91.9-96.0' —	R16: 3 minutes
	101.0				F		



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724122.8 N, 458024.1 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DESCRIPTION   DESCRIPTION	WATER	LEVELS : 7.0	) ft bgs	s on 6	/5/07 START : 6/5/2007 END : 6/	6/200	7 LOGGER : B. Ellis, D. Thomas	
101.3" - Fracture or mechanical break, 30 deg, rough, stepped	>00	(6			DISCONTINUITIES	O	LITHOLOGY	COMMENTS
101.3" - Fracture or mechanical break, 30 deg, rough, stepped	ANE ANE	AAND ≪ %D		ES	DESCRIPTION	3.00		SIZE AND DEPTH OF CASING
101.3" - Fracture or mechanical break, 30 deg. rough, stepped   101.3" - Fracture, horizontal, smooth, planar, 19th   101.7" - Fracture, horizontal, smooth, planar, 19th   105.3"   105.4"   105.3, 105.4, 105.5; 105.65" - Fractures (4), horizontal - 20 deg. smooth, planar, 19th   101.5"   105.4"   105.3, 105.4, 105.5; 105.65" - Fractures (4), horizontal - 20 deg. smooth, planar, 19th   106.5"   106.1, 106.3" - Fracture, horizontal, smooth, planar, 19th   106.5"   106.1, 106.3" - Fractures (2), horizontal, smooth, planar, 19th   106.5"   106.7" - Fracture, norizontal, smooth, undulating, open   100.5"   100.5" - Fracture, 10 deg. smooth, undulating, 106.5"   106.5" - Fracture, norizontal, smooth, planar in 11.1"   11.2" - Fracture, norizontal, smooth, undulating, 106.5"   106.5" - Fracture, norizontal, smooth, planar in 11.1"   11.2" - Fracture, norizontal, smooth, undulating, 106.5"   106.5" - Fractures (2), horizontal, smooth, undulating, 106.5"   106.5" - Fracture, norizontal, smooth, planar in 11.1"   11.2" - Fracture, norizontal, smooth, planar in 11.1"   11.2" - Fracture, norizontal, smooth, planar in undulating, 106.5"   106.5" - Fractures (2), horizontal, smooth, undulating, 106.5"   106.5" - Fractures (2), horizontal, smooth, undulating, 106.5"   106.5" - Fractures (3), horizontal, smooth, planar in undulating, 106.5"   106.5" - Fractures (4), horizontal, smooth, planar in 11.1"   11.2" - Fractures (2), horizontal, smooth, undulating, 11.5"   11.2" - Fractures (3), horizontal, smooth, planar in undulating, 106.5"   106.5" - Fractures (4), horizontal, smooth, planar in undulating, 106.5"   106.5" - Fractures (4), horizontal, smooth, undulating, 106.5"   106.5" - Fractures (4), horizontal, smooth, undulating, 106.5"   106.5" - Fractures (4), horizontal, smooth, undulating, 106.5"   106.5" - Fractures (4), horizontal, smooth, undulating, 106.5"   106.5" - Fractures (5), horizontal, smooth, planar in undulating, 106.5"   106.5" - Fractures (6), horizontal, smooth, planar in undulating, 106.5"   106.5" - Fr	H BE ATIC	TH.	(%)	TUR OC	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	ğ		FLUID LOSS, CORING RATE AND
101.3" - Fracture or mechanical break, 30 deg, rough, stepped	LEV.	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS SURFACE STAINING AND TIGHTNESS.	YME	AND ROCK MASS	DROPS, TEST RESULTS, ETC.
101.3 - Fracture of mechanical break, 30   101.3 - Fracture, horizontal, smooth, planar, tight   101.4 - Fracture, horizontal, rough, undulating   101.6 - Fracture, horizontal, rough, undulating   101.6 - Fracture, horizontal, rough, undulating   101.6 - Fracture, horizontal, rough, undulating   101.6 - Fracture, horizontal, rough, undulating   101.6 - Fracture, horizontal, rough, undulating   101.6 - Fracture, horizontal, rough, undulating   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, undulating, open   101.6 - Horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar, tight   101.6 - Fracture, horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, planar to undulating   101.6 - Horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, undulating, open   101.6 - Horizontal, smooth, planar to undulating, open   101.6 - Horizontal, smooth, planar to undulating, open   10	ООШ	0716	Ľ	шп		S		
101.7" Fracture, horizontal, smooth, planar, tight   103.4" - Fracture, horizontal, rough, undulating   105.3.105.4.105.5.105.65" - Fractures (4), horizontal   106.0   103.4" - Fracture, horizontal, smooth, planar, open   106.1.106.3" - Fractures (2), horizontal   106.0   106.3" - Fractures (3), horizontal   106.0   106.3" - Fractures (3), horizontal   106.0   106.3" - Fractures (3), horizontal   106.0   106.3" - Fractures (3), horizontal   106.0   106.3" - Fractures (3), horizontal   106.0   106.3" - Fractures (3), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (3), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractures (4), horizontal   106.0   106.3" - Fractur	_			2		H	<ul> <li>96.0-96.2' - light olive gray, (5Y 5/2),</li> </ul>	-
R17-HQ   S   S   S   S   S   S   S   S   S	-					Ħ		-
R17-HO	-			0		H	- (1/16") over 5% of rock surface	
105	-	R17-H0						103.4
105	-	5 ft		1			- 101.0-105.8' - yellowish gray, (5Y	1
105.0	-	96%			undulating	t		-
105.3   105.4   105.5   105.65   Fractures (4),   NRT	405			0	-	士		-
No.   No.					_	$\mathbf{H}$		R17: 3 minutes
106.1, 106.3' - Fractures (2), horizontal, smooth, undulating, open  R18-HO  Stit   78	-	400.0				F	-	1
2 smooth, planar, tight 107.11 - Fracture, horizontal, smooth, undulating, open 110. 110. 110. 110. 110. 110. 110. 110.	-	106.0		NR.		Ħ		1
1	-			2		H	106.0-111.0' - yellowish gray, (5Y	1
R18-HO Sft 100% 78 1 1 108.3' - Fracture, 10 deg, smooth, planar, tight 108.65, 109.2' - Fracture, horizontal, smooth, undulating, tight 109.9' - Fracture, 10 deg, smooth, undulating, spen 110.0, 110.0, 110.2, 110.35' - Fractures (4), horizontal, smooth, undulating 110.6' - Fracture or mechanical break, horizontal, smooth, planar 111.0-111.2' - Fracture or mechanical break, horizontal, smooth, planar 111.0-111.2' - Fracture or mechanical break, horizontal, smooth, planar 111.0-111.2' - Fracture or mechanical break, horizontal, smooth, planar to undulating, tight 113.3, 114.4' - Fractures (5), horizontal, smooth, planar to undulating, tight 113.3, 114.4' - Fractures (2), horizontal, smooth, undulating 113.3, 114.4' - Fractures (2), horizontal, smooth, undulating 113.3, 114.4' - Fractures (2), horizontal, smooth, undulating 113.3, 114.4' - Fractures (2), horizontal, smooth, undulating 113.3, 114.4' - Fractures (2), horizontal, smooth, undulating 113.3, 114.4' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), horizontal, smooth, undulating 113.3, 118.6' - Fractures (2), hor	-				107.1' - Fracture horizontal smooth	L		1
R18-HO - St	-			1		H	weak (R1 to R0), very small fossil	
110 100% 108.65, 109.2 - Fracture, horizontal, smooth, undulating, tight 109.9 - Fracture, 10 deg, smooth, undulating, open 110.0, 110.05, 110.2, 110.35 - Fractures (4), horizontal, smooth, planar 111.0-111.2 - Fracture zone, subrounded fragments 112 to 11.2 - Fracture zone, subrounded fragments 112 to 2 111.2 - 111.4, 111.9, 112.3, 112.95 - Fractures (5), horizontal, smooth, undulating 113.3, 114.4 - Fractures (2), horizontal, smooth, undulating 113.3, 114.4 - Fractures (2), horizontal, smooth, undulating 114.9 - Fracture, 5 deg, rough, undulating 115.0 - 116.0 - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), voids (116") over 3% of rock surface, few cavifies up to 1/2" below 115.3 - Start drilling on 6/6/07 at 08:30 - 114.9 - Fracture, 5 deg, rough, undulating 116.0 - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), with some cavifies up to 1/2" below 115.3 - 116.0 - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1 to R2), voids (116") over 3% of rock surface, bioturbated - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1 to R2), voids (116") over 3% of rock surface, bioturbated - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1 to R2), voids (116") over 3% of rock surface, bioturbated - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1 to R2), voids (116") over 3% of rock surface, bioturbated - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1 to R2), voids (116") over 3% of rock surface, bioturbated - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1 to R2), voids (116") over 3% of rock surface, bioturbated - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1 to R2), voids (116") over 3% of	-	R18-HQ				I	– fragments	1
111.0 10.9 s. Fracture, 10 deg, smooth, undulating, open 110.0 110.0, 110.2, 110.35 Fractures (4), horizontal, smooth, undulating 110.6 Fracture or mechanical break, horizontal, smooth, undulating 111.0 111.2 Fracture some channels break, horizontal, smooth, planar 111.0 111.2 Fracture some channels break, horizontal, smooth, planar 111.0 111.2 Fracture some channels break, horizontal, smooth, planar 111.0 111.2 Fracture some channels break, horizontal, smooth, planar to undulating, gipt 112.111.4, 111.9, 112.3, 112.95 Fractures (5), horizontal, smooth, planar to undulating 113.3, 114.4 Fractures (2), horizontal, smooth, undulating 113.3, 114.4 Fractures (2), horizontal, smooth, undulating 113.3, 114.4 Fractures (2), horizontal, smooth, undulating 113.3 fracture, 5 deg, rough, undulating 116.0 Into to medium grained, strong HCl reaction, very weak (Net) (1/6") over 3% of rock surface, bioturbated 118.3 fracture steps of 14% increase in voids to 10% with some cavities up to 1/2" below 115.3 for 30.3 on 6/6/07 at 0.830 frock surface, bioturbated 118.3 fracture steps of 14% increase in voids to 10% with some cavities up to 1/2" below 115.3 for 30.3 on 6/6/07 at 0.830 frock surface, bioturbated 118.3 fracture steps of 14% increase in voids to 10% with some cavities up to 1/2" below 115.3 for 30.3 on 6/6/07 at 0.830 frock surface, bioturbated 118.3 fracture steps of 14% increase in voids to 10% with some cavities up to 1/2" below 115.3 for 30.3 on 6/6/07 at 0.830 frock surface, bioturbated 118.3 fracture steps of 14% increase in voids to 10% with some cavities up to 1/2" below 115.3 for 30.3 on 6/6/07 at 0.830 frock surface, bioturbated 118.3 fracture steps of 14% increase in voids to 10% with some cavities up to 1/2" below 115.3 for 30.3 on 6/6/07 at 0.830 frock surface, bioturbated 118.3 fracture steps of 14% increase in voids to 10% with some cavities up to 1/4" increase in voids to 10% with some cavities up to 1/4" increase in voids to 10% with some cavities up to 1/4" increase in voids to 10% on 6/6/07 at 0.830	_		78	1			-	1
110	-	10070			108.65, 109.2' - Fracture, horizontal, smooth,		-	1
-68.3	110			2	undulating, tight	H	-	1
111.0 111.0 5, 110.2, 110.35 - Fractures (4), horizontal, smooth, undulating 110.6 - Fracture or mechanical break, horizontal, smooth, planar 110.111.2 - Fracture zone, subrounded fragments 1/2" to 2" 112.111.4, 111.9, 112.3, 112.95 - Fractures (5), horizontal, smooth, planar to undulating, light 113.3, 114.4 - Fractures (2), horizontal, smooth, undulating 113.3, 114.4 - Fractures (2), horizontal, smooth, undulating 113.3, 114.4 - Fractures (2), horizontal, smooth, planar to undulating sight 113.3, 114.4 - Fractures (2), horizontal, smooth, undulating 114.9 - Fractures (2), horizontal, smooth, undulating 115.3 - Fractures (2), horizontal, smooth, undulating 116.0 - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCI reaction, very weak (81) of tox R2), voids (116") over 3% of rock surface, bioturbated 118.3 - 114.9 - Fractures (2), borizontal, smooth, planar to undulating 116.0 - 118.5 - yellowish gray, (5Y 8/1), fine to medium grained, strong HCI reaction, very weak (81) of tox R2), voids (116") over 3% of rock surface, bioturbated 118.3 - 117.5 - Fractures (2), borizontal, rough, undulating 119.3 - Fractures (2), borizontal, rough, undulating 119.3 - Fractures (2), horizontal, rough, undulating 119.3 - Fractures (2), horizontal, rough, undulating 119.3 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures (2), horizontal, rough, undulating 119.5 - Fractures				_		F	_	R18: 5 minutes
horizontal, smooth, undulating    11.0.6 - Fracture or mechanical break, horizontal, smooth, planar 111.0-111.2' - Fracture zone, subrounded fragments 1/2" to 2" 111.2-111.4, 111.9, 112.3, 112.95' - Fractures (5), horizontal, smooth, planar to undulating, tight 113.3, 114.4' - Fractures (2), horizontal, smooth, undulating    116.0	-	111.0		5	110.0, 110.05, 110.2, 110.35' - Fractures (4),	H	-	
horizontal, smooth, planar 111.0-111.2" - Fracture zone, subrounded fragments 172" to 2" 111.2-111.4, 111.9, 112.3, 112.95' - Fractures (5), horizontal, smooth, planar to undulating, tight 113.3, 114.4" - Fractures (2), horizontal, smooth, undulating 116.0 NR 1 16.25' - Fracture, borizontal, rough, undulating 120	_			4.0		Ħ		
111.0-111.2' - Fracture zone, subrounded fragments 11/2" to 2" 111.2-111.4, 111.9, 112.3, 112.95' - Fractures (5), horizontal, smooth, planar to undulating, tight 113.3, 114.4' - Fracture, 5 deg, rough, undulating  116.0  NR  116.0  NR  116.0  NR  116.0  NR  118.5' - Fracture, horizontal, rough, undulating  116.25' - Fracture, horizontal, rough, undulating  116.25' - Fracture, horizontal, rough, undulating  116.25' - Fracture, horizontal, rough, undulating  117.4, 117.6' - Fractures (2), 5 deg, rough, stepped  118.3, 118.6' - Fractures (2), horizontal, rough, undulating  119.3' - Fracture, 30 deg, rough, planar, tight 119.5' - Fracture, 80 deg, rough, undulating, fracture extends from 119.3-119.75'  118.5-119.8' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations 119.8-120.7' - Same as 116.0-118.5' recorded	-			>10	horizontal, smooth, planar	H		
R19-HQ 5 ft 94%  115.2-111.4, 111.9, 112.3, 112.95' - Fractures (5), horizontal, smooth, planar to undulating, tight 113.3, 114.4' - Fractures (2), horizontal, smooth, undulating  116.0  NR  1 1 14.9' - Fracture, 5 deg, rough, undulating  116.25' - Fracture, horizontal, rough, undulating  116.0-118.5' - Fracture, horizontal, rough, undulating  117.4, 117.6' - Fractures (2), 5 deg, rough, undulating  118.3, 118.6' - Fractures (2), horizontal, rough, undulating  119.3' - Fractures (2), horizontal, rough, undulating  119.3' - Fractures (2), horizontal, rough, undulating  119.3' - Fractures (2), horizontal, rough, undulating  119.3' - Fractures (2), horizontal, rough, undulating  119.3' - Fracture, 30 deg, rough, planar, tight 119.5' - Fracture, 80 deg, rough, undulating, fracture extends from 119.3-119.75'  118.5-119.8' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations  119.8-120.7' - Same as 116.0-118.5' except uniform throughout R20: Run time not recorded						Н		
The state of the s					111.2-111.4, 111.9, 112.3, 112.95' -		increase in voids to 10% with some	
113.3, 114.4' - Fractures (2), horizontal, smooth, undulating  114.9' - Fracture, 5 deg, rough, undulating  116.0 NR  116.0 NR  1 116.25' - Fracture, horizontal, rough, undulating  1 116.25' - Fracture, horizontal, rough, undulating  2 117.4, 117.6' - Fractures (2), 5 deg, rough, stepped  1 118.3, 118.6' - Fractures (2), horizontal, rough, undulating  1 118.3, 118.6' - Fractures (2), horizontal, rough, undulating  1 118.3, 118.6' - Fractures (2), horizontal, rough, undulating  1 118.5 119.8' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations  1 119.8 - 120.7' - Same as 116.0-118.5' recorded and color variations  1 119.8 - 120.7' - Same as 116.0-118.5' recorded and color variations  1 119.8 - 120.7' - Same as 116.0-118.5' recorded and color variations  1 119.8 - 120.7' - Same as 116.0-118.5' recorded and color variations  1 119.8 - 120.7' - Same as 116.0-118.5' recorded and color variations  1 119.8 - 120.7' - Same as 116.0-118.5' recorded and color variations  1 119.8 - 120.7' - Same as 116.0-118.5' recorded and color variations  1 119.8 - 120.7' - Same as 116.0-118.5' recorded and color variations				1	undulating, tight		cavities up to 1/2" below 115.3'	00.30
11573.3			00	'	113.3, 114.4' - Fractures (2), horizontal,			
115				2	Smooth, undulating			
No Recovery 115.7-116.0' Limestone 116.0-118.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCI reaction, very weak (R1), voids (1/16") over 3% of rock surface, bioturbated  118.3, 118.6' - Fractures (2), horizontal, rough, undulating 119.3' - Fracture, 80 deg, rough, undulating, fracture extends from 119.3-119.75'  No Recovery 115.7-116.0' Limestone 116.0-118.5' - yellowish gray, (5Y 8/1), voids (1/16") over 3% of rock surface, bioturbated  118.5-119.8' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations 119.8-120.7' - Same as 116.0-118.5'  119.8-120.7' - Same as 116.0-118.5'  119.8-120.7' - Same as 116.0-118.5'	115				114.0' Fracture 5 des rough undulation —	$\vdash$	_	
Limestone  1 16.25' - Fracture, horizontal, rough, undulating  1 1 116.25' - Fracture, horizontal, rough, undulating  2 117.4, 117.6' - Fractures (2), 5 deg, rough, stepped  1 18.3, 118.6' - Fractures (2), horizontal, rough, undulating  4 119.3' - Fracture, 30 deg, rough, planar, tight 119.5' - Fracture, 80 deg, rough, undulating, fracture extends from 119.3-119.75'  1 1 16.25' - Fracture, horizontal, rough, undulating gray, (5Y 8/1), fine to medium grained, strong HCI reaction, very weak (R1), voids (1/16") over 3% of rock surface, bioturbated  1 18.5-119.8' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations  1 19.8-120.7' - Same as 116.0-118.5' rough, undulating, fracture extends from 119.3-119.75'	-73.3			0	ाम.७ - Fracture, ७ deg, rough, undulating	F	_	R19: 2 minutes
1 16.25' - Fracture, horizontal, rough, undulating  1 16.25' - Fracture, horizontal, rough, undulating  1 16.0-118.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCI reaction, very weak (R1), voids (1/16") over 3% of rock surface, bioturbated  1 18.5-119.8' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations 1 19.8' - Fracture, 30 deg, rough, undulating, fracture extends from 119.3-119.75'  1 16.0-118.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCI reaction, very weak (R1), voids (1/16") over 3% of rock surface, bioturbated  1 18.5-119.8' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations 1 19.8-120.7' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations 1 19.8-120.7' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations 1 19.8-120.7' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations 1 19.8-120.7' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations 1 19.8-120.7' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations 1 19.8-120.7' - Same as 116.0-118.5'	_	116.0		NR		Ħ		]
R20-HQ 5 ft 94%	_			1		片	Limestone - 116,0-118,5' - yellowish gray. (5Y	SC-3 collected at 116.3-
R20-HQ 5 ft 94%  118.3, 118.6' - Fractures (2), 5 deg, rough, stepped  118.3, 118.6' - Fractures (2), horizontal, rough, undulating  119.3' - Fracture, 30 deg, rough, undulating, fracture extends from 119.3-119.75'  120 -78.3	_			· .	undulating	片	8/1), fine to medium grained, strong	
R20-HQ 5 ft 94% 67 2 118.3, 118.6' - Fractures (2), horizontal, rough, undulating 119.3' - Fracture, 30 deg, rough, planar, tight 119.5' - Fracture, 80 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, planar, tight 119.8-120.7' - Same as 116.0-118.5' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, planar, tight 119.8-120.7' - Same as 116.0-118.5' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, planar, tight 119.8-120.7' - Same as 116.0-118.5' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.8' 5 ample tends to break along bedding planes when handled, rock in core uniform throughout fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fracture extends from 119.3-119.75' 5 deg, rough, undulating, fra	_			2	117.4. 117.6' - Fractures (2). 5 deg. rough	$\vdash$		]
5 ft 94% 67 2 118.3, 118.6' - Fractures (2), horizontal, rough, undulating 119.3' - Fracture, 30 deg, rough, planar, tight 119.5' - Fracture, 80 deg, rough, undulating, fracture extends from 119.3-119.75' 118.5-119.8' - Same as 116.0-118.5' except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural and color variations 119.8-120.7' - Same as 116.0-118.5' Cavities at 117.2', 120.2'; sample tends to break along bedding planes when handled, rock in core uniform throughout R20: Run time not recorded	_	Baa . : :				Ш		
except yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained limestone with some textural along bedding planes when handled, rock in core uniform throughout R20: Run time not recorded	_			2		口	119 5 110 9'	Covition at 117 21 120 21
120   19.5' - Fracture, 80 deg, rough, undulating, fracture extends from 119.3-119.75'   grained limestone with some textural and color variations   handled, rock in core uniform throughout   R20: Run time not recorded	-	94%			rough, undulating	口	<ul> <li>except yellowish gray to very pale</li> </ul>	sample tends to break -
119.5 - Fracture, 80 deg, rought, undulating, and color variations uniform throughout R20: Run time not recorded	-			4		士	orange, (5Y 8/1 to 10YR 8/2), fine	
2 119.8-120.7 - Same as 116.0-118.5 R20: Run time not recorded	120 -78 3					+	<ul> <li>and color variations</li> </ul>	uniform throughout —
121.0 NR No Recovery 120.7-121.0'	-					F	119.8-120.7' - Same as 116.0-118.5'	
	-	121.0		NR		Ħ	No Recovery 120.7-121.0'	-



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-14 SHEET 8 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724122.8 N, 458024.1 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 7.0	ft bg	s on 6	/5/07 START : 6/5/2007 END : 6/	6/200	7 LOGGER : B. Ellis, D. Thomas	
\$ O €	(%			DISCONTINUITIES	F00	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			2	119.55, 119.75' - Fractures (2), horizontal, smooth to rough, planar to undulating, tight to	H	Limestone - 121.0-126.0' - yellowish gray to very	Fossiliferous inclusions at 122.6', cavity at 123.65'
-			0	open 120.4, 120.6, 121.3, 121.4' - Fractures (4), horizontal, smooth, planar		pale orange, (5Y 8/1 to 10YR 8/2), fine to medium grained, strong HCl reaction, very weak (R1), voids (1/16") over 3-5% of rock surface.	(1"), cavities at 125.1' and 125.8' (1/4"-1/2"), partial white infilling of cavities could also be actual fossil
-	R21-HQ 5 ft 100%	80	4	123.1' - Fracture, horizontal, smooth, planar to undulating, open	Ħ	few cavities (1/4"-1/2"), some cavities infilled with white calcareous limestone, some textural and color	could also be actual lossii
125	100%		2	123.25' - Fracture, horizontal, smooth, stepped, open 123.35, 123.45' - Fractures (2), horizontal,		variations similar to 118.5-119.8' from 121.35-122.0', fossiliferous, inclusions at 122.6'	-
125_ -83.3 -	400.0		1	smooth, planar to undulating, open 124.5, 124.6' - Fractures (2), horizontal, smooth, planar	Ħ		R21: 3 minutes
-	126.0		6	125.5' - Fracture, horizontal, smooth, planar, tight 126.1' - Fracture, horizontal, smooth, planar,	Ė	126.0-131.0' - yellowish gray to very  - pale orange, (5Y 8/1 to 10YR 8/2), fine to medium grained, strong HCl	Large bivalve shells at 127.4', 127.5', 126.7'
-			1	open 126.2' - Fracture, 30 deg, smooth, planar, open	Ħ	reaction, very weak (R1), voids  (1/16") over 3% of rock surface, few cavities up to 1/4" from 126.0-127.5',	-
-	R22-HQ 5 ft 100%	85	0	126.75' - Fracture, horizontal, smooth, planar, open 127.8' - Fracture, horizontal, rough, undulating, tight		voids (1/16") over 30% of rock surface, many shallow cavities (1/4"-1/2"), fossiliferous, elongate	-
130	10070		6	129.1-129.6' - Fracture zone or bedding plane, smooth, planar, some ridging	H	molds and casts (1/2"-3/4") from - 127.5-129.15'	-
-88.3	131.0		2	130.0, 130.85' - Fractures (2), horizontal, smooth, planar		-	R22: Run time not recorded - SC-4 collected at 130.1-
-	101.0		3	131.2, 131.5, 131.6' - Fracture zone (3), horizontal, rough, undulating	Ė	131.0-135.7' - Same as 126.0-131.0 - except voids (1/16") over 30% of rock surface from 131.0-131.8'; thin	131.0'
-			3	132.5' - Fracture, 5 deg, smooth, undulating	H	laminae with bedding planes from 132.6-133.3'; thicker brown laminae (1/16"-1") from 134.7-135.1'	-
-	R23-HQ 5 ft 94%	47	2	132.9, 132.95, 133.1, 133.9, 134.5, 134.7, 134.8' - Fractures (7), horizontal, smooth, planar		- - -	
- 135_			3		H	_	_
-93. <del>3</del> -	136.0		2 NR	135.2, 135.35' - Fractures (2), horizontal, smooth, undulating	Ė	- No Recovery 135.7-136.0'	R23: 3 minutes
-			4	136.1' - Fracture, 80 deg, rough, planar 136.25-136.4' - Fracture zone, irregular subrounded fragments up to 2-1/2", bounded	Ė	Limestone 136.0-139.6' - yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2),	_
-			2	by horizontal, smooth planar fractures 136.95' - Fracture, 80 deg, smooth, planar, tight		fine to medium grained, strong HĆl reaction, very weak (R1), brown laminations from 137.3-137.8'	-
-	R24-HQ 5 ft 92%	47	2	137.1' - Fracture, horizontal, smooth, undulating, tight 137.9' - Fracture, horizontal, smooth, planar,	Ħ	-	-
140_ -98.3			5	tight 138.25, 138.8' - Fractures (2), horizontal, smooth, planar	Ħ	_	Cavities at 139.55', 139.5', 139.9', 140.0', 140.1',
-30.5	141.0		2 NR	139.1' - Fracture, horizontal, rough, planar, open to tight		_	140.2', 140.5', 140.6' (up to _ 1")



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-14	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724122.8 N, 458024.1 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

00.1			<u> </u>	MENT . CIVIE 330X 3/N 340233, Mud Totally, Fig tools, Fiv	- ouoi	g		ORIENTATION : Vertical
WATER	LEVELS: 7.0	ft bgs	s on 6	/5/07 START : 6/5/2007 END : 6/	3/200	)7	LOGGER : B. Ellis, D. Thomas	
I.				DISCONTINUITIES	(D	1	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG		DOOK TYPE OOLOD	
H H H	3,5°		吊는	BESSELLE FISH	으	ı	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
AACH		(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	ğ	ı	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
무류	N N N N N N N N N N N N N N N N N N N	ο	SAC ER I	PLANARITY, INFILLING MATERIAL AND	Ĭ	ı	AND ROCK MASS	DROPS, TEST RESULTS, ETC.
20 21 21 22 21		ď	F F	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	ı	CHARACTERISTICS	21.01.0, 1201.12002.10, 21.0.
				139.3' - Fracture, horizontal, rough to	Ш		139.6-140.6' - yellowish gray to	R24: 4 minutes
-			1	smooth, planar to undulating, open	╁		grayish orange, (5Y 8/1 to 10YR 7/4),	Cavities at 141.0', 141.35', -
-				139.45' - Fracture, 50 deg, rough, undulating	屵		fine grained, strong HCl reaction,	141.4', 141.75', 142.1',
				139.7' - Fracture, 40 deg, rough, undulating			strong (R4), voids (1/16") over 3% of	142.7', 143.1'
-			>10	139.9' - Fracture, vertical, rough, planar 140.1' - Fracture, 70 deg, rough, undulating	Ъ-		rock surface, numerous deep cavities (1/2"-3/4") fully penetrating	1
-	R25-HQ			140.25' - Fracture, 50 deg, rough, undulating	₽	_	core	-
-	5 ft	48	>10	141.6' - Fracture, 30 deg, rough, undulating		-	No Recovery 140.6-141.0'	_
	78%			to stepped, tight		1	Limestone	SC-5 collected at 143.8-
				142.3-142.5, 142.8-142.9, 143.2-143.3' -	Н		141.0-144.9' - yellowish gray to	144.8'
l			0	Fracture zone (3), subangular fragments (up	t		dusky yellow, (5Y 7/2 to 5Y 6/4), fine	· · · · · ·
145				to 1 1/2"), bounded by 10 deg, rough, planar			grained, strong HCl reaction, strong (R4), voids (1/16") over 5-10% of	
-103.3			NR	fractures 143.5' - Fracture, horizontal, smooth,	╙		rock surface, many elongate cavities	R25: Run time not recorded –
_	146.0		1417	undulating	Lг	ſ	(1/4"x1/2") with some infilling from	Tecolueu
-	1 <del>-1</del> 0.0			143.9' - Fracture, horizontal, rough,	匚		141.0-143.4; voids (1/16") over 0-5%	-
l -			1	undulating	₽		of rock surface, few to no cavities	-
I _				146.3' - Fracture, 45 deg, smooth, planar	厂		from 143.4-144.9'	]
							No Recovery 144.9-146.0'	
-			0	-	₩		Limestone 146.0-149.2' - dark yellowish orange,	1
-	DOC LIO			-	H		(10YR 6/6), fine to medium grained,	-
l _	R26-HQ 5 ft	75	1	148.35, 149.15, 149.2' - Fractures (3),			strong HCl reaction, weak (R2),	
	98%	7.5	'	horizontal, smooth, planar	Ш		voids (1/16") over 30% of rock	
-				nonzoniai, omootii, pianai	Ħ		surface, some fine laminations	1
-			4	149.4' - Fracture, 80 deg, smooth, undulating			149.2-150.9' - moderate olive brown,	-
150				149.6' - Fracture, horizontal, smooth, planar	$oldsymbol{oldsymbol{\mu}}$		(5Y 4/4), fine to very fine grained, moderate HCl reaction, strong to	
-108.3			4	150.0' - Fracture, 80 deg, rough, undulating	Н		very strong (R4 to R5), voids (1/16")	R26: 4 minutes
-	151.0		4	150.3' - Fracture, vertical, rough, undulating			over 3% of rock surface, rare cavities	1
-	131.0		NR.	150.55' - Fracture, horizontal, rough, undulating	╁		(up to 1/4"), trace organic inclusions	_
l -				\undersity \undersity \undersity	1	<b>–</b> 1	No Recovery 150.9-151.0'	-
l _							Bottom of Boring at 151.0 ft bgs on	
						ı	6/6/2007	
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-15	SHEET	1	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724222.8 N, 458094.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-15/16" tri-cone bit ORIENTATION: Vertical

						iry, auto nammer, AVVJ rous			<del>-</del>	ORIENTATION : Vertical
WATER	LEVELS	: 4.0 ft bo	us on 5/18		START : 5/15/2007	END: 5/17/2007 SOIL DESCRIPTION	LOGG	EK:	1.8	Stewart COMMENTS
≥⊕€			1 (0)	STANDARD PENETRATION		SOIL DESORIE HON		$\dashv$	g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,				SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H B ATIC		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR				ᇟ	DRILLING FLUID LOSS, TESTS, AND
F 유리			#TYPE	6"-6"-6"	CONSISTEN	NCY, SOIL STRUCTURE, N	IINERALOGY		یّز ا	INSTRUMENTATION
42.3	0.0			(N)	Silty Sand (SN	M)		+	77	Sand is silica
-	0.0		00.4	1-1-1	0.0-1.0' - mode	erate yellowish brown, (1	0YR 5/4),	-		-
-		1.0	SS-1	(2)	moist, very loo	ose, very fine to fine grain c fines, organics and roo	ed, 15% fines,	<b>,</b>	Ш	-
-	1.5				decreasing with	th depth	ueis,	/ [		_
_						•				_
l _								1		_
_										
								1		
								1		
								1		Water level approximately 4.0' below ground
5	5.0							1		surface -
37.3	0.0				Clayey Sand (	SC)				$\neg$
-		1.1	SS-2	3-4-5	5.0-6.1' - greer	nisń gray, (5GY 6/1), wet ined, medium to high pla	, loose, very			1
-	6.5		552	(9)	very fine grain	black particles, trace roc	otlets, 35-40%	#	<u>//</u> 4	-
-	0.5				\plastic fines			/ 🕂		-
-								+		-
-								4		-
-								4		-
_								4		=
-								4		_
_								4		_
10	10.0							4	Ш	_
32.3				22.0.7	Silt And Limes	stone Fragments (ML) oderate yellow, (5Y 7/6),	wet stiff	Ш		_
_		1.0	SS-3	23-9-7 (16)	nonplastic, ver	ry rapid dilatancy, modera	ate HCI			Driller's Remark: Complete circulation loss at 10.5' below ground surface
	11.5			(13)	reaction, interb	pedded with 1/8" thick lim	estone lenses	Л		10.5 below ground surface
					\and i limestoi	ne iraginents		1		
_								1		7
_								1		=
-								1		1
1 -								1	1	-
-								+		-
	4.5.5							+		-
15 <u> </u>	15.0 15.2	0.2	SS-4	50/2.5	Silt And Limes	stone Fragments (ML)		$\pm$	П	-
		\		(50/2.5")	\15.0-15.2' - Sa	ame as 10.0-11.0'		/-		-
-								4	ļ	-
_								4		-
-								4		
-								1		
l _								1		
_										
I -								]		
								1		Driller's Remark: Will install 4" HW casing to
20								1		19.0' below ground surface
								$\top$	┪	-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-15	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724222.8 N, 458094.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-15/16" tri-cone bit ORIENTATION: Vertical

					N 3 10025, 11100 1010					T 0	ORIENTATION : Vertical
WATER	LEVELS	: 4.0 ft bo	ıs on 5/1		START : 5/15/2007		: 5/17/2007 CRIPTION	LOGGI	<u> </u>	1. S	Stewart COMMENTS
ŞQ⊋I	044.5.		1 (0)	STANDARD PENETRATION		SOIL DES	UNIF HUN		-	8 <b> </b>	COIVIIVIENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		(ft) PENETRATION TEST RESULTS SOIL NAME, USCS GROUP SYMBOL, COLOR,						SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H B ATIC		RECOVE	RY (ft)		MOISTURE	CONTENT,	RELATIVE DENS	ITY OR	3	嚴	DRILLING FLUID LOSS, TESTS, AND
LEV LEV			#TYPE	6"-6"-6" (N)	CONSISTEN	ICY, SOIL STI	RUCTURE, MINE	RALOGY		₩ X	INSTRUMENTATION
22.3	20.0			(14)	Silty Sand And	d Limestone	Fragments (SN	1)	Ŧ	11	
	20.0	1.0	SS-5	10-32-50/4	20.0-21.0' - mo	derate yello	w, (5Y 7/6), wet,	very			-
-	21.3			(82/10")	dense, fine to	coarse graine	ed, nonplastic, n lastic fines, 20%	noderate	4	Ш	-
-	21.0				coarse gravel	sized limesto	ne, all carbonat	e, trace	/-	- 1	-
_					very fine sand- green particles	sized white	particles, trace b	rilliant	′ -	- 1	_
_					green particles	•			4	- 1	_
_									1	- 1	_
_									1	-	_
									J	- 1	
										- 1	
25	25.0								1	- 1	
17.3	-	0.8	SS-6	25-50/4.5	Silty Sand And	d Limestone	Fragments (SN	1)		П	
-	25.9	0.8	33-0	(75/10.5")	25.0-25.8' - Sa reaction, 50%	me as 20.0-2 silt and 50%	21.0' except mod	derate HCI	4		-
_					(10000011, 0070	<u> </u>				- 1	7
-									1	-	7
-									1	-	7
-									1	-	-
-									+	- 1	-
-									+	-	-
-									+	- 1	-
-									+	- 1	-
30 <u> </u>	30.0 30.3	0.2	SS-7	50/3.5	Limestone Fra	amonte			+	Н	_
12.5	00.0	0.2	33-7	(50/3.5")	\ 30.0-30.2' - me	edium to coa	rse sand-sized a	and fine	Æ	П	-
_					∖gravel-sized, p	oor recovery	<u>'</u>		4	-	-
_									4	-	_
_									4	-	_
_									1	- 1	_
										- 1	
									┚	- 1	
									1	- 1	
]									1		7
35	35.0 35.2								1		-
7.3	35.Ž	0.0	SS-8	50/2	No Recovery	35.0-35.2'			丰	7	Driller's Remark: Will install 4" HW casing
-				(50/2")					1	-	down to 35.0' below ground surface -
-									1	-	7
-									1		-
-									+		-
-									+		-
-									+	-	-
-									+		-
-									+		-
-									+		-
40									+	4	
										_[	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-15	SHEET	3	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724222.8 N, 458094.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-15/16" tri-cone bit ORIENTATION : Vertical

						ry, auto nammer, Avvj rous,			ORIENTATION: Vertical
WATER	LEVELS	. 4.U Tt bo	us on 5/1		START : 5/15/2007	END : 5/17/2007 SOIL DESCRIPTION	LOGGE	<u>ξίΙ.</u> Τ	Stewart COMMENTS
ŞQ⊋	044:5: -		1 (0)	STANDARD PENETRATION		JOIL DESORIF HON		98	COIVIIVILINTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAMI	E, USCS GROUP SYMBOL	. COLOR.	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H B ATI(		RECOVE	RY (ft)		MOISTURE	CONTENT, RELATIVE DE	NSITY OR	30L	DRILLING FLUID LOSS, TESTS, AND
T E R S I			#TYPE	6"-6"-6"	CONSISTEN	CY, SOIL STRUCTURE, MII	NERALOGY	Σ	INSTRUMENTATION
<u> 2.3</u>	40.0			(N)	Silt With Sand	I (MI )		1111	
		0.8	SS-9	44-50/5 (94/11")	40.0-40.8' - ligh	nt olive brown, (5Y 5/6), w	et, hard, fine	$\  \ $	-
-	40.9			(0 1/11 )	to coarse grain	ed, 20-30% sand, nonpla HCl reaction, 5-10% orga	stic, rapid	╂'''	1 -
_					carbonate	norreaction, 5-10% orga	ilics, all	1	_
_									_
									_
							-	1	1
_							•	1	1
45	45.0						•	1	-
-2.7	45.3	0.1	SS-10	50/3.5		gments	Γ		-
-				(50/3.5")	\ 45.0-45.1' - mo	derate olive brown. (5Y 4	/4), mild to	┨	-
-					moderate HCI i	reaction, 10% fine grain, be poor recovery, highly foss	olack particles / . iliferous	┨	-
-					(minor matrix,	poor (ooo (o.), (g) (ooo		┨	-
_								-	-
_							-	-	_
_								1	_
									_
50	50.0						•	1	1
-7.7	50.0 50.2	0.0	SS-11	50/2	No Recovery 5	50.0-50.2'		F	
-				(50/2")				1	1
-							-	1	
-								1	-
-								┨	-
-							-	┨	-
-								┨	-
-								1	-
_								1	_
_									_
55	55.0								_
-12.7	55.3	0.1	SS-12	50/4 (50/4") /	Limestone Fra	<b>agments</b> edium olive brown, (5Y 4/4	) medium	Γ	]
				(55/4)	grained, mild to	o moderate HCl reaction, t	race medium		
					grain-sized blace	ck particles, moderately for	ossiliferous	1	]
]					(casts, molds u	ιμ το 5/8 )		1	]
-							•	1	
-								1	
-								1	-
-								1	
-							-	┨	-
-								1	-
60								$\vdash$	
								1	
								1	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-15	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724222.8 N, 458094.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 2-15/16" tri-cone bit ORIENTATION: Vertical

						ary, auto nammer, AVVJ rous			
WATER	LEVELS	. 4.υ π Ϧϳ	gs on 5/15		START : 5/15/2007	END : 5/17/2007 SOIL DESCRIPTION	LUGGE	Т	T. Stewart COMMENTS
≷Q₽	CAMADI	INITEDY	1 (6)	STANDARD PENETRATION TEST RESULTS	<b>—</b>	JOIL DEGUNIF HON		18	O O O O O O O O O O O O O O O O O O O
ELC ON (	SAMPLE	INTERVA		TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBO	L. COLOR.	2	DEPTH OF CASING, DRILLING RATE,
ATI B		RECOVE			MOISTURE	E CONTENT, RELATIVE D	ENSITY OR	2	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTEN	NCY, SOIL STRUCTURE, M	IINERALOGY	2	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
-17.7	60.0			45-50/3.5	Silty Sand An	d Limestone Fragments	(SM)	Ť	Driller's Remark: Will install 4" HW casing
-	60.8	0.7	SS-13	(95/9.5")	60.0-60.7' - mo	oderate olive brown, (5Y	4/4), wet, very	-[]	down to 61.0' below ground surface
-					plasticity, mild	coarse grained, 20-25% to moderate HCl reaction	n. 40% fine	1	
-					\gravel-sized lir	mestone, poorly fossilifer	ous	┨	
_					Begin Rock Co	oring at 61.0 ft bgs sheet for the rock core log	•	┨	
-					See the next s	sileet for the rock core log		┨	
-								4	
_								┨	
_								-	
_								4	
65 <u> </u>							_	┨	_
-22.7								1	
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-27.7								1	
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-32.7									
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-15 SHEET 5 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724222.8 N, 458094.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

00.1		10 -	<u> </u>	MENT . CIVIE 33 3/N 3 10023, Mud Totally, NQ 10018, HVV C	aonig		ORIENTATION : Vertical
WATER	LEVELS: 4.0	ft bg:	s on 5	/15/07 START : 5/15/2007 END : 5/	17/200	D7 LOGGER : T. Stewart	
	_			DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		(n	DESCRIPTION	SYMBOLIC LOG		
UNA NA NA NA	지수도 I	_	FRACTURES PER FOOT	DESCRIPTION	<u></u>	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H A S E	동돈씨	(%) <sub>Q</sub>	[⊉8	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	9	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
[ 문문	# E S S	OΩ	A P	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ESE ESE	잉필쀲	æ	H H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S√	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	61.0				Н	Limestone	
_			3	61.35' - Mechanical break		- 61.0-63.7' - moderate olive brown to	_
				61.75, 61.9, 61.95' - Bedding plane (3),	Ш	light olive gray, (5Y 4/4 to 5Y 5/2),	
				horizontal, rough, undulating, <1/16" gap,	Н	moderate to strong HCl reaction,	
-			2	possible mechanical break		<ul> <li>medium strong (R3), 15% voids</li> </ul>	-
_						<1/16", infilled cavities with dark gray	_
	R1-NQ		2	63.0, 63.4' - Bedding plane (2), 5 deg and 10	$\vdash$	material (N3)	
_	5 ft 54%	35		deg, rough, undulating, open up to 3/16",	Н	- N B 00 7 00 01	_
-	34%			fracture is through infilled cavity, possible mechanical break		No Recovery 63.7-66.0'	-
l _				mediamical break	$\perp$	_	_
65			NR		Н		
-22.7			'"`		Ш		R1: 16 minutes
-				-	口	_	-
I _	66.0			_	Ш	_	
	Ι Π		.	66.1' - Bedding plane, horizontal, rough,	$\vdash$	Limestone	
1 -			2	undulating, open 1/16"	ш	- 66.0-69.7' - Same as 61.0-63.7'	-
1 -			<u> </u>	66.55, 68.75, 69.0' - Bedding plane (3),	Ш	except olive gray, (5Y 3/2), trace	-
			2	horizontal, rough, undulating, tight, possible	Н	fossil casts, weak rock interval from - 69.0-69.7'	
			-	mechanical break	H	- 09.0-09.7	
-	R2-NQ			67.15, 67.9' - Bedding plane (2), 5 deg and		_	SC-1 collected at 67.9-
_	5 ft	53	2	10 deg, rough, undulating, tight, possible mechanical break	+	_	68.75'
	74%			68.75, 69.0' - Bedding plane (2), horizontal,			
			3	rough, undulating, tight		_	Ī
-			٦	69.25' - Fracture, 10 deg and 15 deg, rough,	$\perp$	-	-
70				undulating, tight	Н	No Recovery 69.7-71.0'	Driller's Remark: Last 14"
-27.7			NR	69.55, 69.65' - Fracture (2), horizontal and 5	П		of run was very soft
-	71.0			deg, tight, fractures are in weak rock interval		_	R2: 16 minutes
-	71.0			-	ш	No Recovery 71.0-72.9'	Assumed core loss from
_				_	Н	-	top 71.0-72.9'
			١				100
			NR		Ш	_	1
-				-	Н	_	-
_				72.0.72.25! Fracture zone subangular and		- Limestone	_
	R3-NQ			72.9-73.35' - Fracture zone, subangular and rounded fragments up to 1-3/8" in size		Limestone 72.9-76.0' - moderate olive brown	
-	5 ft 62%	38	>10	73.35-74.1' - Joint, vertical	Н	grading at 74.7' to light olive brown,	1
-	0∠%		$\vdash$	· -	Н	(5Y 4/4 grading to 5Y 5/6), strong	-
1 -			1	74.1' - Fracture, horizontal, rough, undulating,	Ш	_ HCl reaction, medium strong to weak	
75				open 1/16", broken across infilled void, black stain	$\square$	(R3 to R2), 15% voids <1/16" on	
-32.7					Н	surface in creasing to 30% from 74.7'	R3: 17 minutes
-			3	75.3, 75.5, 75.7' - Fractures (3), 10 deg and -	Ш	with depth, poorly fossiliferous	-
-	76.0			15 deg, rough, undulating, tight, possible	П	(casts), trace unfilled cavities to - 3/8"x3/16" elongated, bioturbated	
			_	mechanical break	$\vdash\vdash$	areas 3% irregularly shaped cavities	
-			2	76.1' - Bedding plane, horizontal, smooth, stepped, tight, possible mechanical break	ш	>1", trace dark gray infill fines	1
-				76.9' - Fracture, 5 deg and 10 deg, rough,	口	- 76.0-81.0' - yellowish gray to light	SC-2 collected at 76.9-
I _			0	undulating, open 1/16"	Н	olive brown, (5Y 8/1 to 5Y 5/6), fine	78.05'
					Н	grained, moderate to strong HCl	10.00
I -	R4-NQ			78.05' - Fractures, 15 deg and 20 deg, rough,	口	reaction, weak to medium strong (R2	1
-	5 ft	84	3	undulating, tight, possible mechanical break	ш	to R3), 30-35% voids <1/16", poorly	-
	100%		L_	78.45' - Fracture, horizontal, rough,	H	fossiliferous (casts), 3-5% dark gray fine to medium grained particles	
1				undulating, tight to 1/2" open	Ш	inic to medium grained particles	1
			2	78.7' - Fracture, horizontal, rough, undulating,	Ш	-	-
80				up to 3/4" open	$\vdash\vdash$		I <sub>24,44</sub> · · · ——————————————————————————————
-37.7				79.4, 79.5' - Bedding plane (2), horizontal,	Н		R4: 11 minutes
	810		1	rough, undulating, open 1/8", possible mechanical break		_	1
	81.0			птеснапісаї ргеак	$\vdash \exists$	_	-



PROJECT NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724222.8 N, 458094.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.0	ft bg	s on 5	/15/07 START : 5/15/2007 END : 5/	17/20	D7 LOGGER : T. Stewart	
≥∩ ∷	6)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
N (#	N, AND ≪Y (%		ES T	DESCRIPTION	S LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE	E RU	(%) 🛭	TUF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RO	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
000	014	ш.	ш.п.	80.2' - Fracture, horizontal, rough, undulating,	10,	Limestone	
-			0	tight, possible mechanical break	H	<ul> <li>81.0-86.0' - light olive brown, (5Y</li> </ul>	-
-	-			92.15 92.5' Dadding plans (2) harizantal	Ħ	6/6), strong HCl reaction, weak (R2), 10-15% mottled yellowish gray (5Y	-
-	1		3	82.15, 82.5' - Bedding plane (2), horizontal, rough, undulating, open 7/16", dry, fine	Ħ	<ul> <li>8/1) with olive gray (5Y 5/2), moderately fossiliferous</li> </ul>	-
-	R5-NQ			laminations 82.8' - Bedding plane, horizontal, rough,	H	(casts/molds), carbonate fines	-
-	5 ft 100%	88	0	undulating, tight, possible mechanical break	H	<ul> <li>(irregularly shaped fines possible bioturbation), trace organic lenses to</li> </ul>	1
-				-	Н	3/8" thick at 82.15' and 82.5', fossils	1
85	•		2	84.35' - Bedding plane, horizontal, rough, undulating, tight, in very weak rock, possible	H	<ul> <li>to 9/16" predominately horizontally oriented and rice shaped with</li> </ul>	1
-42.7	1		_	mechanical break	П	corrugated patterns	R5: 13 minutes
_	86.0		0	84.6' - Bedding plane, horizontal, fracture in bioturbated zone, possible mechanical break	ш		1
			6	86.05, 86.2, 86.35, 86.45, 86.5, 86.7' -		86.0-86.35' - Same as 81.0-86.0' - 86.35-90.7' - white to yellowish gray	]
			$\square$	Bedding plane (6), 0 deg to 5 deg, rough, undulating, 1/16" gap, possible mechanical	Н	with medium dark gray and	
_			0	break	H	moderate yellow, (5Y 8/1 with N4 and 5Y 7/6), very fine grained, strong HCl	
_	- - - - - - - - - - - - - - - - - - -			_	Ħ	reaction, strong (R4), very	]
_		54	2	88.1, 88.5' - Fracture (2), horizontal, rough, undulating, tight, possible mechanical break	Ħ	fossiliferous (casts, microforams), trace spherical voids <1/16",	
_				-	H	bioturbated mottling 30-35% of surface with 15-20% voids <1/16"	
-			3	89.1' - Bedding plane, horizontal 89.4' - Bedding plane, horizontal, possible	H	- Surface with 13-20 % voids < 1/10	-
				mechanical break	H	<u> </u>	R6: 21 minutes
			2	89.55' - Fracture, vertical, rough, undulating, gray staining, tight, with bisecting mechanical	H	_	- 10. 21 minutes
-	91.0		NR.	breaks 90.0' - Fracture, horizontal, rough, undulating,	H	No Recovery 90.7-91.0' Limestone	-
-	-		4	1/8" open	囯	91.0-95.9' - yellowish gray with dark	1
-	-			90.4' - Fracture, horizontal, rough, undulating, tight	世	gray and white, (5Y 7/2 with N3 and N9), strong HCl reaction, weak (R2),	-
-	-		3	91.4, 91.5, 91.7, 91.95, 92.15, 92.4' -	ш	<ul> <li>very fossiliferous (casts, molds, shells) fossils to 7/8", 94.0-95.9'</li> </ul>	1
-	R7-NQ			Fractures (6), horizontal, rough, undulating, tight, possible mechanical break	Ш	apparent bedding and horizontal	1
-	5 ft 98%	60	3	92.95, 93.25, 93.5' - Fractures (3), 5 deg to 10 deg, rough, undulating, tight, possible	Н	- fossil alignment	1
-				mechanical break	Ħ	_	1
95			2	93.75' - Fracture, 30 deg, rough, undulating, tight	Ħ		1
-52.7			2	94.4, 94.6, 95.2, 95.6' - Fractures (4), 0 deg to 5 deg, rough, undulating, tight, possible	Ħ	_	R7: 10 minutes
	96.0			mechanical break	H	= No Decement 05 0 00 0	
_	]		1		H	No Recovery 95.9-96.0' Limestone	]
_	]			96.6' - Fracture, 45 deg, rough, undulating,	H	96.0-101.0' - Same as 91.0-95.9' except medium-sized white (N9) and	
_			1	tight	H	dark gray (N3) grains	SC-3 collected at 98.65- 99.6'
-				97.95' - Fracture, horizontal, rough,	Н	-	-
-	100%	95	2	undulating, open 3/4"	H	_	-
-				98.2' - Fracture, 55 deg, rough, undulating, tight	H	_	-
			1	98.5' - Mechanical break 98.65' - Bedding plane, horizontal, rough,	H	_	-
100_ -57.7	1			undulating, tight, possible mechanical break		<del>-</del>	R8: 9 minutes
-	101.0		1	99.6' - Bedding plane, horizontal, rough, undulating, tight, possible mechanical break	$\square$	-	-
	101.0			and a desired the second secon	П		-
					$\lfloor \lfloor \rfloor$		1

ORIENTATION: Vertical



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724222.8 N, 458094.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

COMINO	WETHODA	ND L	ZUIFIV	MENT: CIME 55 S/N 316625, mud rotary, NQ tools, HW C	asiriy		ORIENTATION: Vertical
WATER	LEVELS : 4.0	ft bg	s on 5	/15/07 START : 5/15/2007 END : 5/	17/200	7 LOGGER : T. Stewart	
>00	<u> </u>			DISCONTINUITIES	υ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OUTE AND DEDTIL OF CASH
ᆱᇬᇋ	RUN H. A ÆR'	(%)	NA P	DEDTH TYPE OPIENTATION POLICINESS	일	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
PTH SVA'	RE I NGT COV	R Q D (%)	ACT 7 FC	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	MBC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SUF	SEN	R Q	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥΪ	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				100.5' - Bedding plane, horizontal, rough,	Ш	Limestone	
-			2	undulating, tight, possible mechanical break -	$\vdash \vdash$	- 101.0-106.0' - yellowish gray with	1
-				101.1' - Bedding plane, horizontal, rough, undulating, tight, possible mechanical break	口	medium gray, (5Y 7/2 with N9), fine to medium grained, strong HCl	1
-			3	101.9' - Fracture, 25 deg to 30 deg, rough, -	₽₩	<ul> <li>reaction, very weak to weak (R1 to</li> </ul>	-
				undulating, tight	Ш	R2), very fossiliferous (microforams,	]
	R9-NQ 5 ft	84	2	102.2, 102.8' - Fracture (2), horizontal, rough, undulating, tight, possible mechanical break	Н	casts, molds >1/8") decreasing abundance with depth, white rounded	]
]	100%	04	_	102.4' - Fracture, 70 deg to 80 deg, rough,	Ħ	elongated grains 25-35% increasing	1
1 7				undulating, 3-7% black stain, tight	Н	with depth, 5-10% medium gray	1
105			1	103.2, 103.5' - Fracture (2), 10 deg to 15 deg, - rough, undulating, tight	Ш	<ul> <li>grains, voids &lt;1/16" 30-40% of surface from 101.0-103.2'</li> </ul>	1 1
-62.7				104.1' - Fracture, 30 deg, rough, undulating,	Н		R9: 9 minutes
-			1	tight, possible mechanical break -	H	-	
-	106.0			105.0' - Fracture, horizontal, rough, undulating, tight, possible mechanical break	Н	- 100 0 111 01 walles in the array with	1 4
			3	106.15, 106.4, 106.9' - Bedding plane or -	Ш	106.0-111.0' - yellowish gray with medium gray, (5Y 7/2 with N5), fine	]
			ľ	mechanical break (3), horizontal, rough,	Н	to medium grained, strong HCl	
]				planar, <1/16" gap 107.0, 107.15' - Bedding plane or mechanical	H	reaction, very weak to weak (R1 to	1
			4	break (2), horizontal, rough, undulating,	Н	<ul> <li>R2), very fossiliferous (predominantly microforams and molds), 3-5%</li> </ul>	1
-	R10-NQ	l !		10-15% black staining	Ш	medium gray grains, voids <1/16"	1 1
-	5 ft	65	3	107.2' - Bedding plane or mechanical break, - horizontal, rough, undulating, tight	Н	<ul> <li>10-15% of surface, 1/4" bedded</li> </ul>	1
-	100%			107.8, 108.1, 108.4' - Mechanical break or	H	accumulation of fossils at 109.1'	1 4
			1	bedding plane (3), 0 deg to 5 deg, smooth,	$\vdash \vdash$	_	]
110_			Ŀ	planar, tight	Ш		
-67.7				109.1' - Bedding plane, horizontal, bedded fossil casts and molds	Ы		R10: 8 minutes
1 7	111.0		2	110.5' - Bedding plane, horizontal, rough,	H	-	1
				undulating, tight, hard mineral surface - 110.8' - Fracture, 55 deg to 60 deg, rough,	Ш	111.0-114.5' - yellowish gray, (5Y	1
-			2	undulating, tight	Ш	- 7/2), medium grained, strong HCI	1 1
-				111.2' - Fracture or mechanical break,	Ш	reaction, very weak (R1), very fossiliferous (microforams, shells,	-
-			5	horizontal, rough, undulating, tight 111.7, 112.0' - Bedding plane (2), 5 deg to 10	$\vdash\vdash$	<ul><li>molds) fossils &gt;75% of rock to 1/16"</li></ul>	1 -
-	<b>5</b>			deg, rough, undulating, tight -	口	trace to 1"	1 4
	R11-NQ 5 ft	28	4	112.2, 112.3' - Bedding plane or mechanical	Н	_	]
	70%		L	break (2), 7 deg to 10 deg, rough, undulating, 1/8" open	Ш	_	
]			2	112.5' - Bedding plane or mechanical break,	$\vdash$		1
115				horizontal, rough, undulating, tight	H	No Recovery 114.5-116.0'	1
-72.7			NR	112.85, 113.0, 113.2' - Bedding plane or — mechanical break (3), 5 deg to 10 deg,	₽		R11: 9 minutes
-			````	rough, undulating, fossil casts/molds on	Ш	-	1 -
-	116.0			fracture surface -	$\vdash$	Limestone	1 4
-			3	113.5' - Mechanical break, rough, undulating, tight	H	Limestone - 116.0-121.0' - Same as 111.0-114.5'	1 4
				ւլցու 113.95' - Fracture, 70 deg, rough, undulating, _	Н	<u>-</u>	]
			2	tight	Ш	_	
1 7			-	114.1, 114.2' - Fracture or mechanical break	$\vdash \vdash \vdash$	-	1
	R12-NQ			(2), horizontal, rough, undulating, tight 116.15, 116.75, 116.9, 117.2, 117.3' -	Ħ	-	1 1
-	5 ft	46	>10	Fracture or mechanical break (5), 0 deg to 5	Н	-	1 1
-	100%			deg, rough, undulating, tight 118.0' - Fracture or mechanical break,	Ш	-	1
-			2	horizontal, tight, in friable rock	H	-	1 4
120				118.3, 118.6 - Fracture, vertical, rough,	H		I 545 44
-77.7			3	undulating, tight	Н	_	R12: 11 minutes
	121.0			118.85-119.1 - Fracture zone	Ш		
						-	



PROJECT NUMBER:

338884.FL

B-15

SHEET 8 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724222.8 N, 458094.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 4.0	ft bgs	s on 5	/15/07 START : 5/15/2007 END : 5/	17/20	D7 LOGGER : T. Stewart	
<b>₹</b> □₽	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(9)	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
PTH I	RE R VGTF COVE	Q D (%)	ACTL R FO	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	MBOI	WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUI	SĒĀ	R	FR. PEI	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
_			2	119.35' - Fracture or mechanical break, 5 deg to 10 deg, rough, undulating, tight	H	<b>Limestone</b> - 121.0-125.3' - yellowish gray, (5Y	_
-				119.8' - Bedding plane, horizontal, smooth, undulating, tight	H	8/1), strong HCl reaction, very weak (R1), voids <1/16" on 15-20% of	-
-			2	120.2, 120.35, 120.55' - Mechanical break or -	H	<ul> <li>surface, very fossiliferous (casts,</li> </ul>	-
-	R13-NQ			bedding plane (3), horizontal, rough, planar, tight	Ш	microforams), trace black laminations possible organics, 5-7%	-
_	5 ft 86%	61	3	121.1' - Bedding plane or mechanical break, - horizontal, rough, undulating, 1/8" open	H	<ul> <li>medium dark gray grains (angular-subangular), 121.6-121.7',</li> </ul>	1
			3	121.6' - discontinuity, nonplanar, undulating, tight, black staining on surface	$\parallel$	very strong HCl reaction, finely laminated slightly coarser grained	]
125 -82.7				122.05, 122.7, 123.05, 123.4, 123.9, 124.6, 124.9, 125.2' - Bedding plane or mechanical	H	infill with undulating bedding planes to 10 deg, possible trace fine quartz	D40: 40
-02.7			1	break (8), horizontal, rough, undulating, tight,	H	_ sand	R13: 10 minutes
-	126.0		NR	fractures through cavities at 125.2' and 123.05'	H	No Recovery 125.3-126.0' Limestone	
-			7	124.0' - Bedding plane or mechanical break, - horizontal, rough, undulating, 3/16" gap	Ħ	<ul> <li>126.0-131.0' - yellow gray with medium dark gray and pale</li> </ul>	1
			6	126.05-130.85 - Bedding plane (16), rough, planar, <1/16" gap	Ħ	yellowish orange, (5Y 8/1 with N4 and 10YR 8/6), very fine to medium	]
	R14-NG 5 ft		2	127.7, 128.05' - Mechanical break or bedding	H	grained, strong HCl reaction, very	]
-	5 ft	41		plane (2), horizontal, rough, undulating, 1/8" gap at 127.7', tight at 128.05'	alternates 127.5-129.0' medium to	-	
_	100%			128.2, 129.3' - Bedding plane or mechanical break (2), 5 deg to 10 deg, rough, undulating,	H	_ coarse grained, very fossiliferous	-
130			2	tight - 129.55' - Bedding plane, horizontal, rough,	H	-	-
-87.7			5	undulating, tight	Ħ	_	R14: Run time not
	131.0		5		H		recorded
-			0	-	Ы	131.0-135.8' - yellowish gray with light olive gray, olive gray and	-
-				132.0' - Bedding plane, 20 deg, rough,	Н	medium dark gray, (5Y 8/1 with 5Y 4/1, 5Y 6/1 and N4), fine to medium	SC-4 collected at 131.0-
-			3	undulating, tight 132.45' - Fracture or mechanical break,	ш	<ul> <li>grained, strong HCl reaction, laminated bedding, very fossiliferous</li> </ul>	132.0'
_	R15-NQ		0	horizontal, rough, undulating	Ħ	(microforams, shells, casts/molds), fossils to 5/8"x3/16", voids <1/16"	1
	5 ft 96%	88	U	132.95' - Bedding plane or mechanical break, - 10 deg to 15 deg, rough, undulating, tight	Щ	15-20% of surface, 3-5% cavities to	]
-			2	134.35' - Bedding plane, 5 deg, rough,	H	3/4"x1/2" from 134.5-135.3' infilled, mineralization subhorizontally	-
135 -92.7				undulating, 1/32" silt and/or clay sized infilling, open 1/16"	H	aligned, 1" scour and fill structure at 134.4'	R15: 12 minutes
-	136.0		1	134.4' - Fracture, undulating, tight 134.9' - Bedding plane or mechanical break,	囯	- 	-
_	100.0		NR °	horizontal, rough, undulating, tight	Ħ	<ul> <li>No Recovery 135.8-136.0'</li> <li>Limestone</li> </ul>	1
_			3	135.45' - Bedding plane or mechanical break, - horizontal, rough, undulating, tight, 3/4" hard	H	136.0-136.5' - yellowish gray, (5Y – 4/4), medium grained, strong HCl	]
_			3	medium gray infilled cavity on surface 136.25, 136.4' - Bedding plane or mechanical		reaction, very weak (R1), thin bedding, 136.0-136.25' rounded clast	-
-	R16-N∩			break, horizontal, rough, planar, 1/16" open 136.5' - Bedding plane or mechanical break,	oxdot	to 1/4" with thin halo on edges, clasts	-
-	R16-NQ - 5 ft 62 96%	62	2	horizontal, rough, undulating, 1" open, through cavity/ bioturbated pockets	Н	strong rock (R4), strongly suggests possible fluvial deposition	-
-				137.2' - Bedding plane or mechanical break, horizontal, rough, undulating, tight, fracture in	Ш	-	
140			3	bioturbated cavity	Ш		]
-97.7			1	137.65' - Bedding plane or mechanical break,		- -	R16: 18 minutes
	141.0				H		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-15	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724222.8 N, 458094.3 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 4.0	) ft bgs	s on <u>5</u>	/15/07 START : 5/15/2007 END : 5/	17/2	2007	LOGGER : T. Stewart	
≥∩≘	(6)			DISCONTINUITIES	ပ္ခ	Ĺ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
145102.7	R17-NQ 5 ft 94% 146.0	70	1 3 0 2 3 NR 1 0 2 8 2 NR	137.8' - Bedding plane or mechanical break, horizontal, rough, undulating, tight, fracture through bioturbated cavity 138.1' - Bedding plane or mechanical break, horizontal, rough, undulating, tight to 1" open 138.7' - Fracture zone, 2" wide with 1/2" to 1-1/2" fragments 139.1' - Fracture or mechanical break, horizontal, rough, undulating, tight organics on 50% of surface 139.7' - Bedding plane or mechanical break, horizontal, rough, undulating, tight 139.8' - Bedding plane or mechanical break, 20 deg, rough, undulating 140.3' - Bedding plane, rough, stepped, tight to 1/16" open, parting along wavy lamination 141.8-145.55' - Bedding plane or mechanical break (6), horizontal, rough, planar, tight 142.0' - Fracture, 70 deg to 80 deg, rough, undulating, tight 142.25' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/2"-1-3/8" open 144.8' - Fracture, 60 deg, rough, undulating, tight 146.1' - Bedding plane or mechanical break, horizontal, rough, undulating, <1/16" open 148.3' - Bedding plane, horizontal, smooth, stepped, tight 148.65' - Bedding plane, horizontal, smooth, stepped, tight 149.0, 149.15' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/16" open 149.0, 149.15' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/16" open 149.2-149.8' - Bedding plane (6), horizontal, rough, undulating, 1/16" open 150.1' - Fracture or mechanical break, horizontal, rough, planar, tight 150.6' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/16" open			Limestone  136.5-138.5' - light olive gray, (5Y 5/2), very fine grained, strong HCI reaction, medium strong (R3), 3-5% voids <1/32", 5% irregularly shaped cavities >2" (bioturbation pockets) with 25-30% voids <1/16" and mottling of moderate yellow rimming, moderate yellow infilin, poorly fossiliferous (casts, molds) 138.5-140.3' - light olive gray, (5Y 5/2), very fine grained, strong HCI reaction, medium strong (R3), moderately fossiliferous (casts, molds) increase abundance with depth, 5% infilled irregularly shaped cavities to 1" with black staining, 3-5% mottling, trace elongated cavities to 3/8"x3/16" 140.3-140.8' - light olive gray, (5Y 5/2), very fine grained, strong HCI reaction, medium strong to strong (R3 to R4), black (<1/32" thick) microlaminations dipping 20-25 deg, trace voids <1/32" No Recovery 140.8-141.0' Limestone 141.0-142.2' - Same as 140.3-140.8' 142.2-145.7' - yellowish gray with grayish orange and light gray, (5Y 8/1 with 10YR 7/4, N6), fine to medium grained, strong HCI reaction, weak (R2), moderately fossiliferous (casts, shells), fossils horizontally aligned, grayish orange grains have a frosted to translucent luster No Recovery 145.7-146.0' Limestone 146.0-151.0' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), very fine to fine grained, strong HCI reaction, medium strong (R3), poorly fossiliferous (casts), 3-5% spherical voids <1/16", 149.2-150.1' weak rock zone of fine to medium grained laminated material alternating yellowish gray and moderate olive brown (5Y 8/1 and 5Y 4/4), 149.2-150.1' similar to 142.2-145.7' No Recovery 150.8-151.0' Bottom of Boring at 151.0 ft bgs on 5/17/2007	SC-5 collected at 141.0- 141.8'  R17: 11 minutes  R17: 11 minutes  13:12 water level in HW casing 6.7' below ground surface End configuration 4" HW to 56.0' below ground surface NQ from 61.0-151.0' below ground surface Soil/split spoon from 0.0- 60.0' Abandonment: 16 bags of type I/II Portland cement Mixed with 37 gallons of water Plus 3 dry bags of Portland R18: 16 minutes
						1		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-16	SHEET	1	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723050.3 N, 457812.4 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 4-7/8" tri-cone bit ORIENTATION: Vertical

					N 252545, Illiud Totalry, auto Hammer, AWS Tous, 4-778 III-cone bit ORIENTATION . Vertical	_
WATER	LEVELS	: 1.6 ft b	gs on 6/14	4/U7 S	START : 4/23/2007 END : 4/25/2007 LOGGER : A. Erickson	$\neg$
200				STANDARD	SOIL DESCRIPTION COMMENTS	4
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
ᆱ끯딭		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
H A A A			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	
SU			"	(N)		
42.6	0.0				Topsoil "Water level is based on Ground Water	
_		1.0	SS-1	0-2-3	\( \bigcup_{0.0-0.2'}\) - wood chips \( \bigcup_{0.0+0.2'}\) - Monitoring at LNP site (FSAR Table 2.4.12.08)"	1
-				(5)	Poorly Graded Sand (SP) 0.2-1.0' - medium light gray, (N6), moist, loose, fine	-
-	1.5				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-
-					organics, and rootlets, sand is silica	4
l _						┛
_					1	
-					<b>†  </b>	7
-					- I	-
-					- 1	-
5	5.0				Develo Overled Overl (OD)	ᅬ
37.6				0.5.4	Poorly Graded Sand (SP) 5.0-6.2' - pale yellowish gray, (5Y 8/1), some mottling,	
I -		1.2	SS-2	3-5-4 (9)	moist to wet, loose, fine grained, nonplastic, no HCl	1
-	6.5			(3)	reaction, trace organics and black mineral, trace	1
-	0.0				\pyrite nodules, sand is silica / -	1
-					-	-
-						-
_					<u> </u>	_
					]	
-					Ţ <b> </b>	1
					† <b>†</b>	-
10 32.6	10.0				Silty Sand (SM)	
- 02.0				0-1-2	10.0-10.2' - light olive gray, (5Y 6/1), wet, very loose,	4
_		1.3	SS-3	(3)	\fine grained, low plasticity, no HCl reaction, sand is \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	_
	11.5				Silica   S	
					Silty Sand With Gravel (SM) 10.2-11.3' - yellowish gray, (5Y 8/1), wet, very loose,	
_					\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1
-					sand-sized carbonate material, 15% gravel-sized	-
-					carbonate material, fossil fragments	-
-						4
-					] ]	4
					]	
15	15.0				1	1
27.6	. 3.0				Limestone Fragments	$\exists$
-		0.8	SS-4	11-15-11	│ \ 15.0-15.1' - mottled yellowish gray and dark yellowish	+
-		0.0	55-4	(26)	orange, (5Y 7/2 and 10YR 6/6), dense, coarse gravel-sized limestone, strong HCl	$\exists$
-	16.5	-				4
-					Silt With Sand (ML)	4
					\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ا
					very still, horpiastic, very rapid dilatancy, mild to	
-					carbonate materials	1
-					1 1	1
-						$\exists$
-					-	$\exists$
20						4



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-16	SHEET	2	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723050.3 N, 457812.4 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 4-7/8" tri-cone bit ORIENTATION : Vertical

						ry, auto naminer, Avvo rous, a			ORIENTATION : Vertical
WATER	LEVELS	: 1.6 ft b	gs on 6/1	4/U <i>/</i> S	START : 4/23/2007	END : 4/25/2007	LOGGE	K : A	A. Erickson
200				STANDARD		SOIL DESCRIPTION		<b>-</b>   ¤	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COU MANA	IE LIGOS ODOLID OVARDOL	COLOR	SYMBOLIC LOG	DEDTILOF CACINO DOULING DATE
		RECOVE	ERY (ft)			IE, USCS GROUP SYMBOL, E CONTENT, RELATIVE DEN		Ī	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
F A Y			#TYPE	6"-6"-6"		ICY, SOIL STRUCTURE, MIN		MB	INSTRUMENTATION
DE SU ELI				(N)				Š	
22.6	20.0				Silt With Sand	i (ML)	=0/ 5	Ш	
_		1.2	SS-5	13-17-20	20.0-21.2 - Sa	me as 15.1-15.8' except 25 vel-sized limestone at top o	5% very fine	111	_
-	04.5			(37)	Sand, fine grav	rei-sized iirriestorie at top o	i sample	Ш	_
-	21.5							┨	-
_								-	_
_								1	_
								J	
								1	1
-								1	-
								┨	-
25 <u> </u>	25.0				Cond: Cilt /14	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	_	-	Crov silies and and white some starts
17.6		0.9	SS-6	26-50/5 (76/11")	Sandy Silt (ML 25.0-25.9' - gra	<b>∟)</b> ayish orange, (10YR 7/4), r	noist to wet.	411	Gray silica sand and white carbonate fragments in sample, assume slough from
	25.9			(76/11)	hard, fine to co	parse grained, 30% fine to	coarse	Ш	upper material
						bonate material, fine to co	arse /	1	
_					\gravei-sized iin	mestone from 25.0'-25.4'		1	1
-								1	-
-								┨	=
_								-	_
_									
								ı	
								1	
30	30.0							1	1
12.6	30.0				Silt With Sand	d (ML)	_	╁	<del> </del>
-		0.9	SS-7	3-36-13	30.0-30.9' - gra	ayish orange, (10YR 7/4), r	noist to wet,	┨║	-
-		0.9	33-1	(49)	hard, fine to co	parse grained, mild to mode fine sand-sized, trace med	erate HCI	╫	┧ -
_	31.5					ized, trace fine gravel-sized		4	_
					carbonate mate			┨	
								ı	
								1	1
-								1	1
-								1	-
-								-	-
-								1	-
35	35.0						_	1_	
7.6					Silty Sand (SM	A)			
		1.3	SS-8	8-12-19	dense fine to a	ayish orange, (10YR 7/4), r coarse grained, 46% fines,	noist to wet, all	11	1
-	36.5			(31)	carbonate	555.50 grainou, 70 /0 11103,		11	1
-	30.5							┨	-
-								┨	-
-								1	_
_								1	
								1	
								1	1
-								1	1
								┨	-
40		-	-					+	<del> </del>
								1	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-16	SHEET	3	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723050.3 N, 457812.4 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 4-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 1.6 ft bo	gs on 6/14	1/07	START : 4/23/2007 END : 4/25/2007 LOGGER : A. Erickson
				STANDARD	SOIL DESCRIPTION COMMENTS
AND N (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
2.6	40.0	0.7	SS-9	43-50/6 (93/12")	Silty Sand (SM) 40.0-40.7' - dark yellowish orange to moderate  yellowish brown, (10YR 6/6 to 10YR 5/4), wet, very dense, fine to coarse grained, mild HCl reaction, 25% nonplastic fines, 10% gravel-sized, all carbonate
- - - - 45_	45.0				Driller's Remark: Hard material at 43.5' below ground surface
-2.4		0.0	\SS-10/	50/0.5 (50/0.5")	No Recovery 45.0-45.04'
- - - -				(30.0.0)	Begin Rock Coring at 46.0 ft bgs See the next sheet for the rock core log
50					<u></u>
-7.4 - -					
-					
-					- - -
55					
-12. <del>4</del> -					
-					<u> </u>
-					
-					
60_					



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-16

SHEET 4 OF 9

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723050.3 N, 457812.4 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS: 1.6	ft bgs	s on 6/	14/07 START : 4/23/2007 END : 4/	25/20	07 LOGGER : A. Erickson	
30₽	<u>(%</u>			DISCONTINUITIES	Jg J	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	•	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H B H	E R.L. STH,	(%) C	JUS	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURI	SOR	R Q D (%)	-RA(	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	46.0	_		40.01.70.1		Limestone	
-			2	46.2' - 70 deg, smooth, undulating, up to 0.4" gap	╁	<ul> <li>46.0-48.5' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl</li> </ul>	-
-				46.65' - Bedding plane, horizontal,	厈	reaction, very weak to weak (R1 to	-
-			0	undulating, bedding plane fracture, smooth to rough, tight up to 0.1" gap	亡	<ul> <li>R2), 25% surface void (1/16"), many cavities up to 9/16"x3/16".</li> </ul>	SC-1 collected at 47.5-
-	R1-NQ				$\vdash$	moderately fossiliferous with fossil	48.4'
-	5 ft 100%	95	1	48.5' - 20 deg, rough, undulating	世	– molds 48.5-51.0' - Same as 46.0'-48.5'	-
-	10070		_		$\bot$	except 40% surface voids (1/16"),	-
50			0		口	<ul> <li>very many cavities up to 3/4" diameter, highly fossiliferous with</li> </ul>	1
-7.4				<del>-</del>	世	fossil molds, mostly oblong up to	R1: 8 minutes
-	51.0		0		世	– 9/16"x1/8"	1
			A		Ъ	51.0-53.55' - yellowish gray, (5Y 7/2),	1
			4		]_	fine to medium grained, strong HCl reaction, extremely weak (R0), very	]
			3	50.22, 54.05' - Mechanical break (10), 0 - 20 deg, rough, undulating, infilling, bedding	F	weakly cemented	
			٥	plane fracture probably mechanical break, all	Ė	_	
_	R2-NQ 5 ft	0	3	have infill due to soft nature of rock fracture surfaces eroding, up to 0.04" gap due to rock	片	_	_
_	64%			surface eroding off/breaking	oxdot	53.55-53.7' - Same as 51.0'-53.55' except 0-5% surface void up to 1/16",	
_			<u>&gt;10</u>		╨	_ few cavities up to 9/16" diameter,	_
55 <u> </u>			NR	<u> </u>	$oldsymbol{\perp}$	poorly fossiliferous, trace black fine to medium grained material	
-12.4			INIX		丌	_ 53.7-54.2' - Same as 51.0'-53.55'	R2: 3 minutes
-	56.0			56.15, 56.7, 56.9, 57.0, 57.25, 57.5, 58.05,	ፗ	No Recovery 54.2-56.0' - Limestone	-
-			3	58.15, 58.2, 58.3, 59.5, 59.8' - Mechanical	世	<ul> <li>56.0-60.4' - yellowish gray, (5Y 7/8),</li> </ul>	-
-				break (12), 10 deg, smooth, undulating, infilling, bedding plane fracture or mechanical	士	strong HCl reaction, extremely weak (R0), up to 1/2" thick bands of	-
-			3	breaks, smooth to rough, planer to	+	<ul> <li>recrystallization from 59.1-59.3' and</li> </ul>	-
-	R3-NQ			undulating, tight to 3/4" thick gap, infill from eroding fracture surface due to soft quality of	╁	60.1-60.4' were very weak rock, weakly cemented, voids (<1/16") on	-
-	5 ft 88%	30	>10	rock 58.1, 58.5' - very weakly cemented rock	F	<ul> <li>surface, 0% from 56.0-58.6', 5-25%</li> <li>voids from 50.8-60.4', cavities</li> </ul>	-
-	00 /0			55.1, 50.5 - very weakly definented fock	뻮	(molds) up to 3/16"x3/8", black	
60			>10		#	<ul> <li>lineations up to 1/8" from 60.0-60.4', fine grained, trace medium grained</li> </ul>	
-17.4			>10	59.9, 60.1' - Fractures, rock fragments zone,	╁		R3: 5 minutes
_	61.0		NR	black staining at 60.1' fracture surface		No Recovery 60.4-61.0'	1
_	-		<b>-10</b>	61.0-61.6' - Fracture zone	$oxed{oxed}$	Limestone	1
			>10	61.7' - Bedding plane or mechanical break,	J	<ul> <li>61.0-62.4' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl</li> </ul>	1
			>10	horizontal, rough, undulating, undulating to	厂	reaction, extremely weak (R0), small voids (1/16") cover 25% of core	
			- 10	62.15, 62.25, 62.4' - Bedding plane or	上	surface, many cavities up to 3/8"	
_	R4-NQ 5 ft	8	>10	mechanical break (3), horizontal, rough, undulating, up to 3/4" gaps on some fractures	上	diameter and 9/16"x3/8", some  - cavities are fossil molds, black	
_	76%		"	62.6' - Fracture or mechanical break, 80 deg,		material up to 3/8" and black	]
_			>10	rough, undulating, half of fracture/one side of fracture's rock is missing	F	lineation up to 3/16" from 61.0-61.65' - 62.4-64.8' - Same as 61.0'-62.4'	_
65_ -22.4				62.8-63.2' - Fracture zone	井	except very weak (R1) No Recovery 64.8-66.0'	D4. 6 minutes
-22.4			NR	64.2, 64.35' - Bedding plane or mechanical break (2), horizontal, rough, undulating, up to	井	- 140 Necovery 04.0-00.0	R4: 6 minutes
	66.0			1/2" gap	⊭		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-16	SHEET	5	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723050.3 N, 457812.4 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 1.6	ft bg	s on 6	/14/07 START : 4/23/2007 END : 4/	2 <u>5/2</u> 0	07 LOGGER : A. Erickson	
>00	(9)			DISCONTINUITIES	<sub>G</sub>	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU STH, OVEF	(%) Q	TUF FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
THE	SORE	ROD	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	₹	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	016	ш	шш	64.3' - Fractures, 80 deg, rough, undulating	0)	Limestone	
-			2	-	F	<ul> <li>66.0-68.9' - yellowish gray, (5Y 7/2),</li> </ul>	-
-				66.8' - Fractures (2), 70 deg, smooth,	Ħ	fine grained, strong HCl reaction, very weak to weak (R1 to R2)	-
-			2	undulating, tight 1/16" gaps 67.12, 67.4' - Fractures (2), 5 deg, smooth,	世	T	-
-	R5-NQ			undulating, 1/2" gap on same surface at 67.4'	₽	-	-
-	5 ft	33	3	68.15' - Fracture, 5 deg, smooth, stepped, discontinuity fracture between hard and soft	Н	-	-
_	96%			rock, large gap	扛	68.9-70.8' - Same as 66.0'-68.9'	-
			5	68.3' - Fracture, 75 deg, rough, undulating, vertical fracture, tight	士	<ul> <li>except dark yellow, (5Y 4/2),</li> <li>extremely weak (R0), 25% voids</li> </ul>	-
70 <u> </u>				68.9' - Mechanical break — 69.3, 70.8' - Mechanical break, due to rock	╁	(<1/16") over core surface from	R5: 7 minutes
-			0	softness	F	66.0-67.8' and 70.5-70.6', no surface voids present due to softness of	-
-	71.0		NR.	71.55, 71.85' - Fractures (2), horizontal and	片	material, few cavities up to	-
-			3	vertical, smooth, undulating, two horizontal fractures, gaps up to 1/2"	H	_ 5/16"x1/8", poorly fossiliferous 70.2-70.8' - Same as 66.0'-68.9'	SC-2 collected at 71.2- 72.0'
-				71.7' - Fracture, vertical, rough, undulating,	L	No Recovery 70.8-71.0'	1
-			0	vertical fracture, gap up to 1/2"	₽	Limestone 71.0-71.6' - Same as 66.0-68.9'	1
-	R6-NQ			-	I	- except moderate olive brown, (5Y	1
-	5 ft 97%	80	0	-	仜	4/4), fine grained, strong HCl reaction, extremely weak (R0)	1
-	31 /0					<ul> <li>71.6-75.85' - Same as 66.0'-68.9' except very weak to weak (R1 to R2),</li> </ul>	1
75			0		┢	voids (<1/16") cover 15% of core	1
-32.4			_		Ħ	surface (variable) with depth, many cavities up to 3/16"	R6: 11 minutes
-	76.0		0		Ħ	- '	1
-	70.0		NR)		L	No Recovery 75.85-76.0'     Limestone	1
-			0	76.4, 76.7, 77.0, 77.3, 77.4, 77.65, 77.8, 79.0, 80.0, 80.25' - Mechanical break (11), infilling,	₽	76.0-76.6' - yellowish gray, (5Y 7/2),	1
_				due to erosion of soft fracture surfaces		<ul> <li>fine grained, strong HCl reaction, very weak (R1), 15% surface</li> </ul>	1
_			0	-	ш	fractures (<1/16"), few cavities up to	1
_	R7-NQ			-	Т	- 2-3/4" 76.6-78.6' - Same as 76.0'-76.6'	1
_	5 ft 92%	34	0	-		except extremely weak (R0)	1
_					$\vdash$	<ul> <li>78.6-79.8' - Same as 76.0'-76.6'</li> <li>except weak (R2), 15-25% surface</li> </ul>	1
80			0		H	voids (<1/16"), cavities up to 1-3/8" — diameter, trace black organics	1
-37.4			0	80.15-80.45' - Fracture zone	片	material up to 2" in diameter	R7: 9 minutes
	81.0		NR		片	79.8-80.6' - Same as 76.0'-76.6' - <b>No Recovery 80.6-81.0'</b>	1
			0	81.2, 81.45, 81.72, 81.8, 82.75, 82.95, 83.4,	L	Limestone	]
			U	83.75, 83.8, 84.75, 85.5' - Mechanical break	F	81.0-81.8' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction,	]
			0	(11)	Ш	extremely weak to very weak (R0 to	]
			J		口	R1), 0-5% surface voids (<1/16")  over core surface dependent on	]
	R8-NQ 5 ft	8	0		Ь	softness of rock, many shallow	]
_	92%		J		F	cavities up to 2" diameter 81.8-82.8' - Same as 81.0-81.8'	]
_			4	84.35, 84.4, 84.5' - Fractures (3), horizontal,	F	except yellowish brown, (10YR 5/4)	]
85			7	rough, undulating, horizontal fractures, up to _	片	82.8-85.6' - Same as 81.0-81.8'	<u> </u>
-42.4			>10	1/4"	片	_	R8: 7 minutes
	86.0		NR		$\vdash$	No Recovery 85.6-86.0'	
L					1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-16	SHEET	6	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723050.3 N, 457812.4 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 1.6	ft bgs	s on 6	/14/07 START : 4/23/2007 END : 4/	25/20	D7 LOGGER : A. Erickson	
≥∩ ∷	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			>10	84.4' - Fracture, vertical, rough, undulating, bounded by horizontal fractures at 84.35-84.4', half of core, other fracture	-		
-	R9-NQ		>10	surface not present 84.95-85.2' - Fracture zone 86.0-87.05' - Fracture zone, rock CaCO3 silt 87.65-87.9' - Fracture zone		(10YR 5/4 to 5Y 7/2), fine grained, strong HCl reaction, extremely weak (R0), black carbon, organic material from 86.0-86.15'	SC-3 collected at 88.0-
-	5 ft 57%	30	0	88.5' - Mechanical break, to fit in box		<ul> <li>86.6-87.9' - Same as 86.0'-86.6'</li> <li>except extremely weak (R0), 40%</li> <li>surface voids (&lt;1/16"), many cavities</li> </ul>	89.1' -
90 -47.4 _			NR	<u>-</u>		up to 9/16" diameter, trace black organic material up to 1/16" 87.9-88.85' - Same as 86.0'-86.6' except very weak to weak (R1 to R2), 25-40% surface voids (<1/16"), many	R9: 7 minutes
-	91.0		3	91.1' - Fracture, 75 deg, rough, undulating, vertical fracture 1/8"	Ë	cavities up to 9/16", few fossil molds  No Recovery 88.85-91.0'  Limestone	-
-	Basis		0	91.8' - Fracture, 60 deg, rough, undulating, vertical fracture 91.9' - Fracture, 40 deg, rough, undulating, diagonal fracture		91.0-95.3' - Same as 87.9'-88.85' - except yellowish gray to yellowish brown, (5Y 7/2 to 10YR 5/4)	- -
- -	R10-NQ 5 ft 100%	75	2	92.8' - Mechanical break, for hardness test 93.5' - Fracture, 60 deg, diagonal fracture, up to 3/4" gap		- -	- -
95 <u> </u>			1	93.8' - Fracture, horizontal, rough, undulating, horizontal fracture, fracture surfaces eroded, up to 3/4" gap — 94.1' - Mechanical break	Ė	94.95-95.25' - Same as 91.0'-95.3' except 5% surface voids (<1/16"),	R10: 8 minutes
-	96.0		>10	94.25' - Fracture, 70 deg, rough, undulating, tight up to 1/4" gap 94.7, 94.85' - Mechanical break		few cavities up to 3/16"  95.3-96.0' - Same as 91.0'-95.3'  except fine grained, extremely weak	_
_			>10	95.3-96.0' - Fracture zone 96.4-96.6' - Fracture zone, 45 deg, rough, undulating, fracture on either side 92.0-97.45' - Fracture zone, horizontal and	目	(R0), 5% surface voids (<1/16"), black organic material up to 3/8" 96.0-97.7' - moderate yellowish	-
- - - 100	R11-NQ 5 ft 34%	17	NR	50 deg, rough, undulating -		brown, (10YR 5/4), fine grained, strong HCl reaction, weak (R2), 25% voids (<1/16") on core surface, many cavities up to 3/8"x9/16", fossil (molds), many fossil casts, recrystallization present No Recovery 97.7-101.0'	- - - -
-57.4 -	101.0			_			R11: 5 minutes
-			2	101.15' - Fracture, 70 deg, rough, undulating, vertical fracture, large gap 101.6' - Bedding plane, horizontal, rough,		Limestone - 101.0-102.6' - Same as 96.0'-97.7'	-
- -	R12-NO		>10	undulating, 1/8" gap 101.95- 102.1' - Fracture zone, rough, undulating, fracture on either side 102.9' - Bedding plane, horizontal, rough,		102.6-103.2' - Same as 96.0'-97.7' except extremely weak (R0), 20%	-
_	R12-NQ - 5 ft - 60%	52	2	undulating, up to 1/4" gap  103.2' - 5 deg, rough, undulating		<ul> <li>surface voids (&lt;1/16"), many cavities up to 5/16"</li> <li>103.2-104.0' - Same as 96.0'-97.7'</li> <li>No Recovery 104.0-106.0'</li> </ul>	SC-4 collected at 103.2- 104.0'
105 -62.4 -			NR				R12: 8 minutes
	106.0						



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-16

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723050.3 N, 457812.4 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS: 1.6	ft bg	s on 6/	14/07 START : 4/23/2007 END : 4/	25/200	7 LOGGER : A. Erickson	
≥∩≘	(%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	TH,	(%) Q	F.0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ğ	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥMB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	035	α.	# 5	THICKNESS, SURFACE STAINING, AND TIGHTINESS	Ś	CHARACTERISTICS	· ·
_			3	106.2' - Fracture zone	廾	Limestone - 106.0-107.15' - yellowish gray to	_
_				106.5' - Fractures, horizontal, rough, undulating, up to 1/4" gap	Ш	dusky yellow, (5Y 7/2 to 5Y 6/4), fine	_
			4	106.75' - Mechanical break	Ш	grained, strong HCl reaction, very weak (R1), voids (<1/16") over	
			7	107.1' - Fracture, horizontal, rough, stepped,	Н	20-40% of surface, silt infill in void	
	R13-NQ		4	up to 1/2" gap 107.3' - Fracture, 55 deg, rough, undulating,		spaces present, many cavities up to - 1-3/16"x3/4", many fossil molds	
	5 ft 96%	50	1	up to 1/4" gap		107.15-110.8' - Same as	1
			_	107.35' - Fracture, horizontal, rough, undulating	H	106.0'-107.15' except weak (R2)	1
110			1	107.9' - Fracture, horizontal, smooth,	Ш	=	1
-67.4				undulating, large gap with rock crush on part — of fracture	ш		R13: 13 minutes
_	111.0		6	108.7' - Fracture, 80 deg, smooth, undulating,	╂┼╂	-	-
-	111.0		NR	half of fracture is rock crush	口	No Recovery 110.8-111.0'     Limestone	-
-			2	111.2' - Mechanical break 111.4' - Fracture, 20 deg, rough, stepped,	Ш	111.0-114.3' - Same as	-
-				gap up to 1.5"	╂┴╂	- 107.15'-110.8'	-
-			5	111.65' - Mechanical break, 50 deg, smooth, undulating, tight	口	-	-
_	R14-NQ			112.35' - Fracture, 80 deg, rough, undulating,	+ + +	_	-
_	5 ft	25	1	black, half of fracture surface/side missing,	$\Box$	_	-
_	66%		4	little black staining 112.35, 112.75' - Fractures, 20 deg, rough,	凵	_	-
_			_1_	undulating, gaps up to 3/4" thick with rock	╁┼┤	No Recovery 114.3-116.0'	_
115_				fragments 112.8' - Fracture, 70 deg, rough, undulating, —	Щ		
-72.4			NR	half of fracture is rock fragments	Ш	_	R14: 7 minutes
	116.0			112.95' - 60 deg, smooth, undulating, up to 1/2" gap	Н	_	_
			>10	113.7' - Fracture, 30 deg, smooth, undulating,	H	Limestone - 116.0-118.4' - moderate yellowish	SC-5 collected at 116.0- 117.2' -
			/10	tight 114' - Fracture, 80 deg, rough, undulating,	Ш	brown, (10YR 5/4), fine grained,	- 117.2
			. 10	fracture 113.5-114.3', half fracture is rock	Н	strong HCl reaction, very weak to	1
			>10	fragments 116.0-116.3' - Fracture zone	Ш	<ul> <li>weak (R1 to R2), voids (&lt;1/16") over</li> <li>15% of core surface, many small</li> </ul>	1
_	R15-NQ		2	117.3' - Mechanical break	Ш	cavities up to 3/8"x1/16"	1
	5 ft 48%	25		117.45-117.9' - Fracture zone	H	No Recovery 118.4-121.0'	1
_				118.05' - Fracture, horizontal, smooth, undulating, tight up to 1/8" gap	Ħ	=	1 -
120			NR	118.25' - 10 deg, rough, undulating		-	1
-77.4				_	╂┼╂		R15: 6 minutes
-	121.0				囯	-	
-	121.0				団	_ Limestone	
-			1	404 GE 400 GL Front	╂┼╂	- 121.0-124.1' - Same as 116.0'-118.4'	-
-				121.65, 122.6' - Fracture, rough, stepped, half of fracture is not present	冄	except many cavities up to 3/8" diameter or 9/16"x3/16", few fossil	-
-			>10	121.9' - Fracture, vertical and 5 deg, rough,		molds with recrystalized surfaces	-
-	R16-NQ			stepped, fracture pair runs from121.65-122.6', half of fracture is crushed	╂┴┨	-	-
-	5 ft	40	2	or not present	$\Box$	_	
_	62%		0	122.1, 122.25' - Fracture zone 123.2' - Mechanical break, rough, stepped,	丗		-
_				up to 1/2" gap	╂┼╂	No Recovery 124.1-126.0'	-
125_			NR	123.5' - Mechanical break, horizontal, rough,	口	_	
-82.4				stepped, tight up to 1/4" gap 123.75' - Mechanical break, horizontal,	丗	_	R16: 8 minutes
	126.0			rough, up to 3/4" gap	Ш		



PROJECT NUMBER:

33884.FL

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SHEET 8 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723050.3 N, 457812.4 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS: 1.6	ft bgs	s on 6/	14/07 START : 4/23/2007 END : 4/	25/20	07 LOGGER : A. Erickson	
30₽	(%			DISCONTINUITIES	J g	LITHOLOGY	COMMENTS
AN (#	ANE RY (9		RES	DESCRIPTION		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
				126.0-126.3' - Fracture zone	口	Limestone	
-			>10	126.5' - Fracture, horizontal, rough, undulating, up to 1/2" gaps 126.85' - Mechanical break, 5 deg, rough, undulating, up to 1/2" gaps		<ul> <li>126.0-127.35' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, extremely weak</li> <li>to very weak (R0 to R1), surface voids (&lt;1/16") up to 15%, many</li> </ul>	-
- - -	R17-NQ 5 ft 27%	0	NR	127.0-127.35' - Fracture zone		cavities up to 3/16"x3/8", little recrystallization No Recovery 127.35-131.0'	- -
130					世	-	-
-87.4					丁	<del>-</del> -	R17: 6 minutes
-	131.0			131.0-132.3' - Fracture zone	H	_ Limestone	-
-			>10	10.10 100.0 1100.010 20110	廿	- 131.0-134.3' - Same as 126.0'-127.35' except light olive gray,	-
			>10		茾	(5Y 5/2), very weak to weak (R1 to R2), voids (<1/16") over 0-5% at	
_	D40 NO				片	surface, few fossil molds, cavities up to 3/8"	-
-	R18-NQ 5 ft 26%	0			$\pm$	-	-
-	20%		NR		$\pm$	- No Books with 424 2 420 0	-
135_	35				上	No Recovery 134.3-136.0'	
-92.4					上	-	R18: 9 minutes
-	136.0				扞	Limestone	-
-			>10	136.35' - Fracture, 30 deg, rough, stepped, up to 1/4" gap	$\blacksquare$	<ul> <li>136.0-137.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4),</li> </ul>	-
-			>10	136.5' - Fracture, 80 deg, rough, undulating, up to 1/8" gap 136.6-136.85' - Fracture zone		fine to medium grained, strong HCl reaction, extremely weak (R0), 25% surface voids (<1/16"), many cavities	-
	R19-NQ	15	>10	136.85, 137.0' - Fracture, vertical, smooth, undulating, half of fracture missing	世	up to 1/4"x3/16", trace fossil casts - 137.0-138.5' - light olive gray, (5Y	_
_	5 ft 50%	10		137.0-137.46' - Fracture rinssing 137.9' - Fracture, vertical, smooth,	厂	5/2), fine grained, strong HCl reaction, weak (R2), 5% surface	]
140			NR	undulating, 1/4" gap 138.0-138.1' - Fracture zone		<ul> <li>voids (&lt;1/16"), many cavities up to</li> <li>3/8"x9/16", moderately fossiliferous</li> </ul>	-
140 -97.4			1411	138.2, 138.35' - Mechanical break, horizontal		with molds and casts  No Recovery 138.5-141.0'	R19: 8 minutes
_	141.0				]	-	
_			>10	141.25-141.6' - Fracture zone	井	Limestone - 141.0-141.3' - yellowish gray, (5Y	-
-				141.85, 141.95, 142.05' - Mechanical break (3), horizontal and 15 deg, rough, undulating,	Ħ	7/2), fine grained, strong HCl reaction, weak (R2), 15% surface	-
_			>10	tight up to 1/4" gap  141.9' - Fracture, 80 deg, rough, undulating,	丘	<ul><li>voids (&lt;1/16"), many cavities and molds up to 3/16"x3/8"</li></ul>	
-	R20-NQ 5 ft	7	_1_	black, rock fragments on one half of fracture 142.0-142.25' - Fracture zone	上	141.3-143.35' - Same as - 141.0'-141.3' except extremely weak	-
-	47%			142.25, 142.4, 142.55, 142.8, 142.95' - Bedding plane (5), rough, undulating, up to	世	to very weak (R0 to R1)  No Recovery 143.35-146.0'	-
145			NR	1/2" gap	ፗ	-	-
-102.4						<del>-</del> -	R20: 8 minutes
	146.0				$\vdash$		_
					•		1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-16	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723050.3 N, 457812.4 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 1.6	ft bgs	s on 6/	/14/07 START : 4/23/2007 END : 4	/25/2	007	LOGGER : A. Erickson	
30₽	(%			DISCONTINUITIES	_ ၂ ဗ္ဂ	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B	E RU STH, OVEI	R Q D (%)	FOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	RQ	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM		AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
					廿	t	Limestone	
_			0		世	╁	146.0-148.0' - yellowish gray, (5Y 7/2), fine to medium grained, strong	-
_				147.2' - Fracture, 10 deg and 40 deg, rough,	Ъ	╁	HCl reaction, extremely weak to	-
			1	undulating, up to 1" gap	$\perp$	╁	weak (R0 to R2), 5-15% surface voids (<1/16"), many cavities up to	-
1 _	R21-NQ 5 ft	50	>10	148.0, 148.12, 148.25, 148.4, 148.5, 148.6' - Fracture, 5 deg, rough, undulating	$\mathbf{F}$	Ŧ	3/16" 148.0-148.3' - Same as 146.0'-148.0'	
_	100%	30	-10	148.75' - Mechanical break, rough,	F	1	except 25% surface voids (<1/16"),	_
_			>10	undulating, 1/8"-1/4" gaps 148.9' - Fracture, 70 deg, rough, undulating,	Ħ	1	many cavities up to 3/16"x3/8" 148.3-151.0' - Same as 146.0'-148.0'	_
150 -107.4				gray/black _	井	┇	_	
-107.4			>10	148.75-149.3' - Fracture zone 149.5' - Fracture, horizontal and vertical,	片	⇟		R21: 9 minutes
-	151.0			rough, undulating, tight to 1/2" gap \[ \text{149.65-150.5'} - Fracture zone \]	╆	╁	Bottom of Boring at 151.0 ft bgs on	_
_				\\\( 149.00-150.5 - Fracture Zone \\\ \)	-	ŀ	4/25/2007	-
-					-	ŀ		-
-					1	ŀ		-
-					1	ŀ		-
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_						L		_
_					1	L		_
_					4	L		_
_					4	L		_
_					4	F		-
_					-	F		-
_					-	ŀ		-
-				-	+	$\vdash$	_	-
-					-	F		-
-					1	F		-
-					1	F		-
-					1	F		-
-					1	r		-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-17	SHEET	1	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723177.4 N, 457948.0 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

DRILLIN	GMETH	JD AND	EQUIPINI	ENT : CIVIE 55 S/I	N 316625, Mud rotary,	, auto hammer, AWJ rods	, 3-7/8" tri-cone bit		ORIENTATION : Vertical			
WATER	LEVELS	: 2.5 ft bo	gs on 3/28	3/07	START : 3/28/2007	END: 4/4/2007	LOGGEF	R : A.	Teal, R. McComb			
				STANDARD		SOIL DESCRIPTION		(5)	COMMENTS			
≳5€	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION				<b>1</b> 0 1				
O H H		RECOVE		TEST RESULTS	SOIL NAME	, USCS GROUP SYMBOL	_, COLOR,	임	DEPTH OF CASING, DRILLING RATE,			
A A T		RECOVE			MOISTURE (	CONTENT, RELATIVE DE	NSITY OR	BO	DRILLING FLUID LOSS, TESTS, AND			
DEPTH BELOW SURFACE AND ELEVATION (ft)		1	#TYPE	6"-6"-6" (N)	COMOIOTEINO	Y, SOIL STRUCTURE, M	INERALUGT	SYMBOLIC LOG	INSTRUMENTATION			
42.2	0.0	<del>                                     </del>	$\vdash$	(14)	Topsoil			7/1/2				
'	. 0.0			0-1-2		sh black, (5YR 2/1)	/-	-	Drilling with 3-7/8" tri-cone bit			
-		0.3	SS-1	(3)		•	-	]	Diffilling with 3-776 th-come bit			
l _	1.5				]		_		اِ			
								]				
-	1	1					-	1	1			
-	1	1					-	1	Driller's Remark: Water encountered at			
-	-	1						1	approximately 2.5' below ground surface			
-		1							_			
_	]	1					-	]	_			
<u> </u>		1					_		_			
5		1						1				
37.2	1	1						1				
-	1	1					-	1	Medium to heavy chatter at 5.5-6.0'			
-	-	1					-	-	-			
-	6.5	ļ			Olevery Cond (C)	<u> </u>		////	_			
] _	]	1		224	Clayey Sand (SO	<b>c)</b> ive gray, (5Y 6/1), wet, \	en loose -		<u>_</u>			
		0.6	SS-2	2-2-1 (3)	very fine to fine	silica sand, 40% mediu	m to high	ľ				
-	8.0	1		(0)	plastic fines, trac			1	]			
-	0.5				1		<del>-</del>	1	_			
-	1	1					-	1	-			
-	-	1					-	-	_			
-		1					-	]	_			
10	]	1						]	<u> </u>			
32.2		1							Moderate chatter at approximately 10'			
		1					-	1	_			
-	1	1					-	1	-			
-	1	1					-	1	-			
-	-	1					-	-	_			
_	_	1					-	]	<u>-</u>			
l _	13.0							Ш	_			
1	Γ	Γ	Γ		Limestone Frag	ments		H				
-	1	0.8	SS-3	5-5-3	13.0-13.3 - Mou	lerate yellowish brown to 5/4 to 10YR 7/4), strong	grayisn / -	Щ				
-	1 44 5			(8)	Silt (ML)			1				
	14.5	<del>                                     </del>	$\vdash$		1 \ 13.3-13.8' - grav	rish yellow, (5Y 8/4), we	t, medium stiff, /	1	-			
15	-	1			\nonplastic, rapid	l dilatancy, strong HCl re	eaction, 10%					
27.2	_	1			very fine sand-si	ized, carbonate		]	<u>-</u>			
l _		1					_		_			
		1						1				
-	1	1					-	1	-			
-	1	1					-	1	-			
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l _		1					_		_			
		1						]				
-	19.5	1					·-	1	-			
	15.5				<del> </del>		-	╂╥╓	-			
20	-	<del>                                     </del>			<del> </del>			╂╨╜				



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-17	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723177.4 N, 457948.0 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.5 ft bo	gs on 3/28	3/07 5	START : 3/28/2007 END : 4/4/2007 LOGGER : A. Teal, R. McComb		
				STANDARD	SOIL DESCRIPTION O COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE INTERVAL (ft)  PENE		SAMPLE INTERVAL (ft)  RECOVERY (ft)  PENETRATIC TEST RESUL				SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH B		RECOVE		011 011 011	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		
DEP SUR ELE			#TYPE	6"-6"-6" (N)			
22.2		1.2	SS-4	12-11-6 (17)	Silt (ML) 19.5-20.7' - yellowish gray, (5Y 7/2), wet, very stiff,		
-	21.0				nonplastic, very rapid dilatancy, moderate to strong HCI reaction, 10% very fine to medium sand-sized,		
-	-				\all carbonate   \		
-					-		
-	-				1		
	]				]		
-	_				_		
					-		
25 <u> </u>							
-	26.0				1		
				10.00	Silt With Sand (ML)		
_		0.4	SS-5	10-3-2 (5)	26.0-26.4' - yellowish gray, (5Y 7/2), wet, medium stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 20% very fine to medium sand-sized, coarse		
-	27.5				│ ∖gravel-sized limestone fragments, all carbonate		
-					material		
-					<u> </u>		
-					1		
30					]		
12.2	-						
-	_				- 1		
-					<del> </del>		
	32.5						
		4.0	000	17-18-50/4	Sandy Silt (ML) 32.5-33.75' - dark yellowish orange, (10YR 6/6), moist		
-	33.8	1.3	SS-6	(68/10")	to wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 25-30% fine to coarse		
-	- 00.0				sand-sized, all carbonate		
35					Begin Rock Coring at 34.5 ft bgs		
7.2	]				See the next sheet for the rock core log		
_					]		
-							
-	-						
-	-						
-	]				1		
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-							
40							
1							



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-17	SHEET	3	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723177.4 N, 457948.0 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

00111110			2011 11	TENT . CIVIE 33 3/N 3 10023, Midd Totally, NQ tools, HVV C	<u>.</u>		ORIENTATION : Vertical
WATER	LEVELS: 2.5	ft bg	s on 3	/28/07 START : 3/28/2007 END : 4/4	1/200	LOGGER : A. Teal, R. McComb	
I				DISCONTINUITIES	(0)	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	DOCK TYPE COLOR	
N H N	N. A. Y.		FRACTURES PER FOOT	DEGORII HON	일	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
AASE		(%) <sub>Q</sub>	ΞĞ	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	ğ	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
무류편		Ø	SAC ER I	PLANARITY, INFILLING MATERIAL AND	¥	AND ROCK MASS	DROPS, TEST RESULTS, ETC.
E S E		ď	표표	THICKNESS, SURFACE STAINING, AND TIGHTNESS	ŝ	CHARACTERISTICS	Briol of Teol Meddero, Ero.
35	34.5		0			Limestone	Begin rock coring 3/28/07
7.2	R1-NQ				Н	— 34.5-34.7' - light olive gray, (5Y 5/2),	at 16:14 at depth of 34.5' —
l '	2 ft	0	١	_	Н	fine grained, medium strong (R3),	Driller's Remark: Hard
	10%	O	NR		ш	moderate HCl reaction on	material, loud chatter
-				-		- scratched/pulverized sample, no to	R1: 18 minutes -
-	36.5			-	ш	very mild HCl reaction on fresh surface, 10-15% coverage of voids	-
l _			6	36.65' - Fracture, 50 deg, rough, undulating,	Ы	- 1/16" or less on matrix, some	
			0	fairly tight	ĽТ	casts/molds (poorly fossiliferous)	Very hard material, set
-				36.7' - Fracture, 10 deg, rough, undulating,		No Recovery 34.7-36.5'	casing to 37.5'
_			3	tight	Н	- Limestone	casing to 37.5
				36.75' - Fracture, 60 deg, rough, planar, tight 36.8' - Fracture, 75 deg, rough, undulating,	Н	36.5-40.5' - pale yellowish brown,	
_	R2-NQ			open		(10YR 6/2), fine to medium grained,	1
-	5 ft	40	4	37.0' - Fracture, 10 deg, rough, undulating,	Ш	<ul> <li>very weak to weak (R1 to R2), mild</li> </ul>	-
Ι -	80%			tight -	Н	HCL reaction on clean surface,	]
40				37.4' - Mechanical break	Ш	moderate to fast HCl reaction on pulverized sample, 10-15% coverage	
2.2			2	37.7, 37.9, 38.4, 38.6, 38.8' - Fractures (5),		of voids 1/16" or less, cavities are	
-				10-45 deg, rough, undulating, open	ш	elongate and ovate with some up to	DO: D: :: 4: :: -4 : :4 :-
			NR	38.8-39' - crushed section, possibly due to	Н	_ 3/4" x 3/8", fossiliferous (casts and	R2: Run time not recorded
	41.5		INK	drilling	Н	molds)	1
-	41.5			39.2, 39.65, 40.25' - Fractures (3), 20-40 deg,	ш	No Recovery 40.5-46.5'	1
_				rough, undulating, open	Н	_	_
					Н		
_				-	hП	=	1
-				-		-	-
l _				_	ш	=	
	R3-NQ				Н		
_	5 ft 0%	0	NR	-		_	1
-	0%			-	ш	_	-
45					Ы		
-2.8					Г'		
-				-	Ш	-	R3: 2 minutes
-				-	Н	-	I
l _	46.5				Н		
				46.65' - Fracture, 40 deg, rough, stepped,		Limestone	
-			4	tight		<ul> <li>46.5-49.35' - pale yellowish brown,</li> </ul>	1
-				46.82' - Fracture, <5 deg, rough, undulating,	₽	(10YR 6/2), fine grained, mild HCI	-
			,	tight	Н	reaction, very weak (R1), 15-20%	
1			3	46.92' - Fracture, <5 deg, rough, stepped,		<ul> <li>coverage of voids 1/16" or less,</li> <li>5-10% organic material appears as</li> </ul>	1
1 -	R4-NQ			tight -	ш	thin black lines up to 1/32" thick,	-
-	5 ft	0	3	47.12' - Fracture, 10 deg, rough, stepped,	H	- trace fossil casts/molds, cavities	]
	57%	•		tight 47.6' - Fracture, <5 deg, rough, stepped, -	Ľ	(generally subspherical 3/8" in	
ΕO	1			47.6 - Fracture, <5 deg, rough, stepped, -	Ш	diameter) over 1-2%	1
50 <u> </u>				47.92' - Fracture, <5 deg, rough, undulating,	$\vdash$	— No Recovery 49.35-51.5'	⊢
,.0			NR	tight -	Н	<u> </u>	<u> </u>
				48.4, 48.58' - Fractures (2), 10 deg, rough,			R4: 2 minutes
-				stepped, open	$\vdash \vdash$	-	1
-	51.5			48.72' - Fracture, <5 deg, rough, stepped,	Н	_	-
Ι -			2	tight	Ш	_	l J
				48.9' - Fracture, <5 deg, rough, stepped,			]
1 -				open _ 51.6' - Fracture, 10 deg, rough, undulating,	ш	_	-
-			3	open, 50% coverage for clay infilling	H	_	4
				52.1, 53.2, 53.3' - Fractures (3), 20-50 deg,	亡		
1	R5-NQ			rough, undulating, open	Ш		1
-	5 ft	85	0	53.6' - Fracture, <5 deg, rough, undulating,	$\vdash\vdash\vdash$	-	-
L	95%			open	H	_	
L_	<u> </u>				L		<u>                                       </u>
		_					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-17	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723177.4 N, 457948.0 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.5	ft bg	s on 3/	28/07 START : 3/28/2007 END : 4/-	4/200	7 LOGGER : A. Teal, R. McComb	
≥D≎	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
ELO N (#	AND 3Y (%	_	ÆS T	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	CORE RUN, LENGTH, AND RECOVERY (%) R Q D (%) FRACTURES PER FOOT		DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
55_ -12.8		0				Limestone  — 51.5-56.25' - pale yellowish brown,  _ (10YR 6/2), fine grained, mild HCl	_
-			1	55.7' - Fracture, 60 deg, rough, planar, very tight		reaction, alternating zones of (R0)  extremely weak rock material	R5: 2 minutes
-	56.5		NR	-	L	especially from 54.0-55.5' to (R3) medium strong rock, 10-15%	-
_	-		0		片	<ul> <li>coverage of voids 1/16" or less,</li> <li>cavities common up to 1" x 3", poorly</li> <li>fossiliferous (casts and molds),</li> </ul>	-
-			2	57.8' - Fracture, vertical, rough, planar, 15% coverage black staining, fracture trace from	F	<ul> <li>occasional thin black organic name</li> </ul>	_
-	R6-NQ 5 ft	85	1	57.0-58.35' 58.3' - Fracture, 60 deg, rough, undulating, very tight	H	No Recovery 56.25-56.5' Limestone 56.5-61.5' - pale yellowish brown,	SC-1 collected at 59.0-
60_	100%		1	59.0' - Fracture, 10 deg, smooth, stepped, tight —	臣	(10YR 6/2), fine grained, very weak to weak (R1 to R2), 10-15%	59.9' – Note: Core box indicates
-17. <del>8</del>	-		·	59.9' - Fracture, 15 deg, smooth, undulating, tight		coverage of voids 1/16" or less, few cavities, HCl reaction changes with	special core collected from 60.0-60.9', it also appears - that up to 0.5 of core is
_	61.5		1	61.3' - Fracture, 20 deg, rough, undulating,	H	<ul> <li>hardness (harder material less reactive), sparsely fossiliferous casts and molds, occasional thin black</li> </ul>	missing from box R6: 4 minutes
-	_		1	open 62.1' - Fracture, 10 deg, rough, undulating,		organic laminae 61.5-62.3' - pale yellowish brown,	-
_	-		1	open		(10YR 6/2), fine grained, mild HCl reaction, very weak (R1), 20-30%	=
-	R7-NQ			63.2' - Fracture, 10 deg, smooth, undulating, tight	世	coverage of voids 1/16" or less on surface, cavities over 5-10% surface	-
-	5 ft 98%	87	3	63.55, 64.1' - Fractures (2), 20 deg, rough, undulating, tight	Ħ	up to 3/8" in diameter, irregularly shaped, some cavities up to 3/8"-3/4" in length, trace cavity infilling, trace	-
65 <u> </u>	_		2	64.45, 65.0' - Fractures (2), 10-25 deg, smooth, undulating, tight —	┢	fossil molds/casts 62.3-63.15' - Same as 61.5-62.3'	_
-	-		2	65.2' - Fracture, 15 deg, rough, undulating, black carbonaceous coating over 30% of surface, open	Ħ	- except absent to rare cavities, <5% coverage of small (<1/16") voids	R7: 3 minutes
-	66.5		NR)	65.8' - Fracture, 25 deg, rough, undulating, open	Ħ	63.15-65.35' - Same as 61.5-62.3' - except interval at 65.05-65.25' which	_
-			1	66.2' - Fracture, 85 deg, rough, planar, very tight, incipient "hair line" fracture from	崫	is very fine grained (chalk like), very weak (R1), with mild HCl reaction and <1% voids/cavities, incipient	-
-	-		1	65.85-66.4' 67.4' - Fracture, horizontal, smooth, planar, very tight		fracture traces from 65.05 to 66.4 65.35-66.4' - yellowish gray to light	-
-	R8-NQ 5 ft	100	7	67.9' - Fracture, 5 deg, smooth, undulating, tight	Ħ	<ul> <li>olive gray, (5Y 7/2 to 5Y 5/2), fine grained, mild HCl reaction, weak (R2), some very thin, black</li> </ul>	- -
70	100%			68.65, 69.9' - Fractures (2), 15-20 deg, rough, undulating, tight	F	carbonaceous/organic laminae, trace coverage of voids 1/16" or less on	-
-27.8			1		H	surface, becoming more common (up to 10%) with depth, cavities	R8: 5 minutes
-	71.5		2	70.7, 71.2' - Fractures (2), 50 deg, rough, planar, tight	崖	generally <3/8" in diameter  No Recovery 66.4-66.5' Limestone	-
-			0		厈	66.5-67.4' - Same as 65.35-66.4' except strong HCl reaction,	-
-			4	72.5-72.6' - solution cavity 72.75' - Fracture, 15 deg, smooth, undulating,	F	interbedding of light olive gray, very fine grained material that is harder than matrix, thin beds up to 1/2"	-
-	R9-NQ			open 72.76-72.8' - limestone fragments	臣	thick, some cavity infilling, possible bioturbation	-
_	5 ft 90%	83	1	73.25' - Fracture, 20 deg, rough, undulating, open	巨	_	_

ORIENTATION: Vertical



PROJECT NUMBER:	BORING NUMBER:				-	
338884.FL	B-17	SHEET	5	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723177.4 N, 457948.0 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 2.5	ft bgs	s on 3/	28/07 START : 3/28/2007 END : 4/	4/200	7 LOGGER : A. Teal, R. McComb	
₽DŞ	(%			DISCONTINUITIES	၂ ၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) O D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
75_ -32.8	OIM	<b>K</b>	1	73.6, 74.8' - Fractures (2), 5-10 deg, smooth, undulating, open	s 	Limestone — 67.4-69.4' - grayish orange, (10YR 7/4), very fine grained, extremely	-
-	70.5		0 NR		E	weak to very weak (R0 to R1), trace voids and cavities but increasing	R9: 6 minutes
-	76.5		>10	76.5-77.9' - Fracture zone, limestone fragments from gravel to cobble sized		below 69.0', thinly laminated with wispy, black, carbonaceous material at top of interval, fossils rare to absent	Stop drilling for day, 3/29/07 at 10:29 Resume drilling 4/3/07 at
-			>10			69.4-71.5' - Same as 65.35-66.4' except coverage of voids/cavities	09:54
-	R10-NQ 5 ft	10	>10	78.2, 78.45, 78.6' - Fractures (3), 20-30 deg, rough, undulating, open	H	10-15% 71.5-72.5' - Same as 67.4-71.5' - except rounded to irregularly shaped	
80 <u> </u>	62%			79.1-79.6' - Fracture zone, limestone fragments from gravel to cobble size  —		limestone clasts in a dark yellowish brown (10YR 4/2) limestone matrix, very fine grained, 50-60% coverage of voids 1/16" or less	_
-			NR		Ħ	72.5-75.0' - pale yellowish brown with yellowish gray mottling, (10YR 6/2 and 5Y 7/2), fine grained, mild HCl	R10: 3 minutes
-	81.5		>10	81.5-82.0' - Fracture zone, limestone fragments from gravel to cobble size	Ħ	reaction, very weak to weak (R1 to R2), trace fossils, some irregularly shaped limestone (clast-like)	
-			1	82.2' - Fracture, vertical, rough, planar, tight (incipient) 82.4, 82.95' - Fractures (2), 15 deg, rough,		features with 1-3% coverage of voids 1/16" or less on surface, remainder of limestone essentially void free,	
-	R11-NQ 5 ft	68	1	undulating, tight 83.6' - Fracture, 10 deg, rough, undulating, open	Ħ	occasionally thinly laminated with trace black organic material 75.0-76.0' - yellowish gray, (5Y 7/2),	
- 85 <u>-</u> -42.8	84%		0	· -		fine grained, mild HCl reaction, very weak (R1), 1-2% coverage of voids 1/16" or less, occasionally thinly	_
-			1 NR	85.6' - Fracture, 30 deg, rough, undulating, open	Ħ	laminated with white, discontinuous limestone, some intraclasts/cavity infilling, core surface	R11: 5 minutes
-	86.5		2	86.6' - Fracture, vertical, rough, planar, open 86.7' - Fracture, 25 deg, rough, undulating,		irregular/indented No Recovery 76.0-76.5' Limestone	SC-2 collected at 86.7- 87.65'
-			1	open 87.7' - Fracture, 10 deg, rough, undulating, tight	Ħ	- 76.5-79.6' - mild HCl reaction, very weak (R1), highly fossiliferous, 50-60% coverage of voids 1/16" or	61.55
-	R12-NQ 5 ft	60	1	89.0' - Fracture, 60 deg, rough, undulating,		less (highly variable through sample),     many cavities up to 3/8", 10-15%     coverage of black organics,	
90 <u> </u>	84%		>10	tight 89.75-90.7' - Fracture zone, limestone	Ħ	elongated cavity 1" wide by 1.5" long     by 0.5" deep at 78.2-78.35' infilled     with dark yellowish brown material in	_
-			NR	fragments from gravel to cobble size, some black carbonaceous coating on partings		a radiating horizontal pattern, non calcareous, trace charcoal gray material at 79.0-79.5'	R12: 7 minutes
-	91.5		>10	91.5-92.7' - Fracture zone, rough, stepped to undulating, various angles, tight to open		No Recovery 79.6-81.5' Limestone 81.5-83.4' - yellowish gray mottled,	
-			4		F	(5Y 7/2 and 5Y 8/1), fine grained, mild HCl reaction, very weak to weak (R1 to R2), 35-40% coverage of	
-	R13-NQ 5 ft	6	6	93.15' - Fracture, 70 deg, rough, undulating, tight 93.3' - Fracture, horizontal, rough, undulating,		voids 1/16" or less on surface, cavities up to 1 3/16"- 1 9/16" by 3/8"-3/4" (especially near base of	
	90%			1/16" open	H	interval), trace fossils (casts/molds)	

ORIENTATION: Vertical



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-17	SHEET	6	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723177.4 N, 457948.0 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

				HENT . CIVIE 33 3/N 310023, Mud Totally, NQ tools, HW C			
WATER	LEVELS: 2.5	ft bg	s on 3	/28/07 START : 3/28/2007 END : 4/	4/200	LOGGER : A. Teal, R. McComb	
	<u></u>			DISCONTINUITIES	ניז	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	DOOK TYPE OOLOD	
ON PER	Ϋ́ Ā.Ā.	<u> </u>	Ä.	DECOMI HON	<u></u>	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
ATICE	SE	(%) <sub>Q</sub>	ĮΣ	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ĭ	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
F 두 것	S S S S S S S S S S S S S S S S S S S	O	AC R F	PLANARITY, INFILLING MATERIAL AND	ME	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
교외교	898	ď	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	BROI O, TEOT REGGETO, ETC.
05				93.55' - Fracture, horizontal, rough,		Limestone	
95 <u> </u>			3	undulating, brown clay coating over 20-30%, -	<b>-</b>	+ 83.4-83.7' - grayish orange, (10YR	
-52.0				open	$\vdash$	7/4), fine grained, mild HCl reaction,	_
			1	93.8' - Fracture, horizontal, smooth, planar,	Н	very weak (R1), thinly laminated,	R13: 7 minutes
_			NR	tight, (clay contact)		black carbonaceous laminae present,	R. McComb logged -
_	96.5		INK	93.97' - Fracture, horizontal, smooth, planar,	$\perp$	some voids (<1%) at top of interval,	discontinuities for R13
			.40	horizontal, tight 94.25, 94.37' - Fractures (2), horizontal,		friable  -   83.7-85.7' - Same as 81.5-83.4'	
			>10	rough, undulating, 1 3/16"-1 9/16" open	1	except circular to subcircular cavities	1
-				94.50-94.60' - Fracture zone, rough, multiple		common (3/8" or less in diameter),	-
_			4	orientation	<b>↓</b>	- some cavity infilling	_
				94.9' - Fracture, horizontal, rough, undulating,	$\vdash$	No Recovery 85.7-86.5'	
	R14-NQ			up to 1/16" open		Limestone	1000
-	5 ft	42	10	95.25' - Fracture, 0-70 deg, rough,	┌	- 86.5-90.7' - Same as 81.3-83.4'	SC-3 collected at 98.7-
	70%			undulating, open	╁┴	except voids and cavities up to 10%	99.6'
100			5	95.5' - Fracture zone, 80 deg, rough, planar		coverage from 87.65-89.0' increasing	
-57.8				to undulating, several en echelon fracture		to 20-30% coverage below 89.0',	-
-			l	planes 96.0' - Fracture, 50 deg, rough, undulating	Ш	black carbonaceous coating on bedding plane at 90.5'	D44: C minutes
			NR	96.5-97.0' - Fracture, 30 deg, rough, undulating	$\vdash$	No Recovery 90.7-91.5'	R14: 6 minutes
	101 5			rough, stepped to undulating, tight to open	1	Limestone	Driller's Remark: Lost
-	101.5			97.4-97.7' - Fracture zone, high angle, criss		91.5-92.0' - Same as 81.5-83.4'	circulation at about 101.0' -
_			10	cross fractures intersecting at 45 degrees,	$\perp$	_ 92.0-93.0' - yellowish gray, (5Y 8/1),	_
				rough, planar, tight		very fine grained, strong HCI	
_				97.85' - Fracture, 40 deg, rough, stepped,	t	reaction, medium strong (R3),	_
_			>10	tight		_ moderately fossiliferous, trace	-
				98.0' - Fracture, 15 deg, rough, undulating,	$\perp$	coverage of voids 1/16" or less on	_
	R15-NQ		0	open 98.1' - Fracture, 45 deg, rough, planar, tight	$\vdash$	surface, trace cavities 93.0-93.6' - yellowish gray, (5Y 7/2),	
_	5 ft	20		98.7' - Fracture, 20 deg, rough, undulating,	1	fine grained, very weak (R1), cavities	Driller's Remark: Regained
_	46%			open	oxdot	numerous at contact of overlying	circulation at about 104.0'
105				99.6-100.1' - Fracture zone, various angles,	Н	interval, 1-2% coverage of voids	
-62.8			NR	rough, stepped to undulating, tight to open	╁	1/16" or less on surface	
-				101.6' - Fracture, 10 deg, smooth, undulating,		Lignite	R15: 4 minutes
_				open, possible mechanical break	1	93.6-94.1' - no HCl reaction, laminar	- Tribi 4 minutes
	106.5			101.7' - Fracture, 15 deg, smooth, undulating,	$\vdash$	bedding	
1 7				open 102.3-103.2' - Fracture zone, predominately	1 -	Limestone	1
-			>10	horizontal to <5 deg, stepped to undulating,	┌	94.1-95.2' - medium grained, mild	-
				open, coarse gravel size rock fragments	igspace	HCl reaction, extremely weak to very	
			,	106.5-107.2' - Fracture zone, predominately	$\vdash$	weak (R0 to R1) 95.2-96.0' - yellowish gray, (5Y 7/2),	
1 7			1	horizontal to <5 deg, stepped to undulating,	Ľ	moderate HCl reaction, very weak to	1
-	D46 NO			open, coarse gravel size rock fragments	Ш	weak (R1 to R2), thinly laminated	-
	R16-NQ 5 ft	40	1	107.2, 107.35' - Fractures (2), <5 deg, rough,	$oldsymbol{+}$	with white HCl reactive limestone,	
	90%	<del>-</del> U	'	stepped, open	$\vdash$	fossiliferous (molds/casts), 10-15%	
1 ,,, =	00,0			107.43, 107.57' - Fractures (2), <5 deg,	仜	coverage of voids on surface, trace	R16: 4 minutes
110 -67.8			>10	rough, undulating, open 109.4' - Fracture, 30 deg, rough, undulating,	$\prod$	cavities (3/8" or less in diameter)	_
-07.8				tight	┵	No Recovery 96.0-96.5'	
1			>10	109.8-110.9' - Fracture zone, fragments up to		Limestone	1
-				gravel size, angular to subangular		_ 96.5-100.0' - Same as 92.0-93.0' except becoming pale yellowish	-
-	111.5		NR		$\vdash$	brown (10YR 6/2) with depth,	1
			امدا	111.5-111.85' - Fracture zone, limestone	$\vdash$	fossiliferous, with gastropods	
]			>10		1	common (elongated spiral	1
-				112.0' - Fracture, 50 deg, rough, planar, tight	仜	individuals), intermittently	-
			1	112.7-113.8' - Fractures (2), 30 deg, rough,	$\vdash$	interbedded with medium grained	SC-4 collected at 112.7-
			'	undulating, tight	$\vdash$	limestone with 15-20% coverage of	113.8'
-	R17-NQ				仜	1/16" or less voids on surface	
-	5 ft	78	1		ightharpoonup	No Recovery 100.0-101.5'	-
	100%				$\vdash$		



PROJECT NUMBER:	BORING NUMBER:			
338884.FL	B-17	SHEET	7 OF 9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723177.4 N, 457948.0 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.5	ft bg	s on 3/	28/07 START : 3/28/2007 END : 4/-	4/200	7 LOGGER : A. Teal, R. McComb	
				DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU STH, OVEF	(%) <sub>Q</sub>	156 176	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT SURF	SECO	ο×	RAC ER I	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	0716	IĽ.	шш		0)	Limestone	
115 <u> </u>			2	114.75' - Fracture, 65 deg, rough, planar,	H	<ul><li>101.5-103.8' - pale yellowish brown,</li></ul>	_
-				tight 115.4' - Fracture, 25 deg, rough, undulating,	世	(10YR 6/2), fine grained, mild to moderate HCl reaction, weak to	R17: 4 minutes
-			3	open	H	<ul> <li>medium strong (R2 to R3), 10-15%</li> </ul>	-
-	116.5			115.6' - Fracture, 30 deg, rough, stepped, (bidirectional), open	$\Box$	coverage of voids 1/16" or less on surface, cavities 3/8"-3/4" in length	-
-			0	116.0' - Fracture, 30 deg, rough, undulating, open	口	<ul> <li>(elongated), fossiliferous</li> </ul>	-
-				116.25' - Fracture, vertical, smooth, planar,	ш	(casts/molds) No Recovery 103.8-106.5'	-
-			2	tight, secondary fracture at 90 degrees to above fracture	+	– Limestone	=
-	R18-NQ			117.5' - Fracture, 20 deg, rough, undulating,	H	106.5-111.0' - Same as 101.5-103.8' except very weak (R1), 20-25%	-
-	5 ft	85	3	tight 117.9' - Mechanical break	H	<ul> <li>coverage of small cavities, fewer</li> </ul>	-
-	96%			118.75' - Fracture, 10 deg, rough, undulating,	世	fossils, very friable No Recovery 111.0-111.5'	-
120 -77.8			2	tight, organic infilling (lignite) 119.1, 119.35' - Fractures (2), 10 deg and 15		Limestone 111.5-116.5' - yellowish gray, (5Y	_
-				deg, rough, undulating, tight	₽	7/2), fine grained, mild HCl reaction,	R18: 3 minutes
-			2	120.1' - Fracture, 10 deg, smooth, undulating, open	匚	<ul> <li>weak (R2), no apparent bedding,</li> <li>15-25% coverage of voids 1/16" or</li> </ul>	-
-	121.5		NR.	120.5' - Fracture, 20 deg, rough, undulating,	世	less, many cavities up to 3/8", trace	-
-			>10	tight 121.0' - Fracture, 30 deg, rough, undulating,	$\Box$	<ul> <li>very fine grained lenses, less fossiliferous</li> </ul>	-
-				open	╁┌	116.5-121.3' - Same as 111.5-116.5'	=
-			0	121.2' - Fracture, 10 deg, smooth, undulating, open	Ħ	except mild to moderate HCl reaction, except many cavities 1"-2",	=
-	R19-NQ			121.5-121.7' - Fracture zone, horizontal, rough, planar to undulating, open	世	fossiliferous (molds and casts),	-
-	5 ft 91%	67	2	121.9' - Fracture, 40 deg, rough, planar, open	H	intervals of very weak (R1) limestone with few voids/cavities with up to 1/8"	-
405	9170			124.3' - Fracture, vertical, smooth, planar, tight	╁	thick wavy laminations	-
125 -82.8			10	124.35-124.65' - Fracture zone, inclined to	$\Box$	No Recovery 121.3-121.5' Limestone	_
-			2	near vertical, rough, stepped to undulating, - tight, several fracture planes	仜	121.5-126.05' - yellowish gray, (5Y 7/2), fine grained, medium strong to	R19: 6 minutes
-	126.5		NR	124.65-124.72' - Fracture zone, rough,	ш	strong (R3 to R4), 15-20% coverage	-
-	120.5			planar, gravel size limestone fragments bounded by horizontal open bedding planes	╁	<ul> <li>of voids 1/16" or less, few cavities to 1/4", fossiliferous (molds/casts of</li> </ul>	-
-			1	124.92' - Fracture, <5 deg, smooth,	F	echinoids/gastropods), intervals of	-
-				undulating, open 125.85' - Fracture, 60 deg, rough, undulating,	片	<ul> <li>dusky yellow green (5GY 5/2), very fine grained limestone with strong</li> </ul>	-
-			1	extends from 125.7-126.05', tight, secondary		HCI reaction at 121.7-122.3',	
-	R20-NQ			fracture off main fracture also at high angles 127.0' - Fracture, 75 deg, rough, undulating,	世	<ul> <li>124.6-125.1' and 126.0-126.05'</li> <li>No Recovery 126.05-126.5'</li> </ul>	
-	5 ft 95%	68	3	tight, extends from 126.5-127.3' 128.1' - Fracture, 60 deg, smooth, planar,	۳	Limestone	-
130	55,5			tight	匚	<ul> <li>126.5-131.25' - Same as</li> <li>111.5-116.5' except weak to medium</li> </ul>	
-87.8			4	128.8' - Fracture, 15 deg, rough, undulating, open	口	strong (R2 to R3), with medium	
			2	129.0' - Fracture, 85 deg, rough, planar, silty	$\perp$	<ul> <li>strong to strong (R3 to R4) interval at 130.0-130.4'</li> </ul>	R20: 5 minutes
	131.5		NR	sand infilling 129.2' - Fracture, <5 deg, rough, undulating,	$\vdash$	-	]
				open	H	No Recovery 131.25-131.5' Limestone	
			0	129.9' - Fracture, 10 deg, rough, undulating, open	Ħ	131.5-133.2' - Same as 126.5-131.25'	
1 1				130.0, 130.2, 130.3' - Fractures (3), 20 deg,	世	_ 120.0-101.20	1
1 1			>10	smooth, undulating, tight 130.6' - Fracture, 35 deg, rough, undulating,	╨		1
1 1	R21-NQ			tight	$\square$		
1 1	5 ft 90%	48	2	130.85' - Fracture, 30 deg, rough, undulating, open	$\Box$		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-17	SHEET	8	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723177.4 N, 457948.0 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.5	ft bg	s on 3	/28/07 START : 3/28/2007 END : 4/4	1/2007	Z LOGGER : A. Teal, R. McComb	
≥∩ ∷	6)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
135_ -92.8 -	136.5				Limestone  133.2-135.25' - yellowish gray, (5Y 7/2), fine to very fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), 1-2% coverage of voids 1/16" or less	R21: 4 minutes	
- - -	R22-NQ		4	multiple high angle fracture planes 136.6' - Fracture, <5-90 deg, rough, stepped, open 137.3' - Fracture, 20 deg, smooth, planar, very tight 137.85' - Fracture, 30 deg, rough, undulating, open 138.0' - Fracture, 70 deg, rough, undulating,		on surface, fossil molds/casts trace to absent 135.25-136.0' - pale yellowish brown, (10YR 6/2), fine grained, mild HCI reaction, very weak (R1), 3-5% coverage of voids 1/16" or less on surface, cavities (up to 3/8") common No Recovery 136.0-136.5'	- - - -
140_ -97.8 -	5 ft 62% 141.5	25	>10 NR	tight 138.37' - Fracture, <5 deg, rough, stepped, tight 138.5' - Fracture, 0-60 deg, rough, stepped, tight 138.8-139.0' - Fracture zone, 0-90 deg, smooth, stepped		Limestone  136.5-138.35' - yellowish gray, (5Y — 7/2), moderate HCl reaction, weak (R2), 10-15% coverage of voids 1/16" or less distributed unevenly across core surface, cavities common (3/8" or less), poorly	R22: 12 minutes -
- - - - - 145	R23-NQ 5 ft 82%	45	>10 10 10	139.3' - Fracture, 0-70 deg, rough, stepped, open 139.3-139.6' - Fracture zone, 0-90 deg, smooth, stepped 141.5-142' - Fracture zone, 0-90 deg, rough, stepped to undulating, open 142.85' - Fracture, 20 deg, rough, undulating, tight 143.1, 143.25, 143.4' - Fractures (3), 60 deg, smooth, planar, very tight		fossiliferous (molds/casts)  138.35-138.8' - Same as 135.25-136.0'  138.8-139.0' - yellowish gray to light gray, (5Y 7/2 to N7), very fine grained, moderate HCl reaction, medium strong (R3), trace coverage of voids 1/16" or less, 1 cavity (3/8"), possible limestone intraclasts, fossils absent	SC-5 collected at 142.0- 142.85 - -
-102.8 -102.8 -	146.5		2 NR	143.5' - Fracture, 60 deg, rough, stepped, bidirectional, open 143.6' - Fracture, 60 deg, rough, stepped, (bidirectional-partial removal of rock core interval), open 143.75' - Fracture, 20 deg, smooth,		139.0-139.6' - yellowish gray, (5Y 7/2), moderate to strong HCl reaction, very weak to weak (R1 to R2), 3-5% coverage of voids 1/16" or less on surface, cavities common up to 3/8"-3/4"	R23: 12 minutes
- - -	R24-NQ 5 ft 100%	87	3	undulating, tight 143.95' - Fracture, 40 deg, smooth, planar, open 144.0-144.3' - Fracture zone, 0-50 deg, rough to smooth, planar to stepped 144.85' - Fracture, <5 deg, rough, undulating, open 145.3' - Fracture, 30 deg, rough, undulating,		No Recovery 139.6-141.5' Limestone  141.5-143.7' - grayish yellow to pale yellowish brown, (10YR 7/4 to 10YR 6/2), very fine grained, mild to moderate HCI reaction, strong to very strong (R4 to R5) from 142.75-143.0', becoming less strong	- - - -
150 -107.8 - - - -	151.5		2	open 147.65' - Fracture, 60 deg, rough, planar, open 147.9' - Fracture, 50 deg, rough, undulating, open 148.0' - Fracture, horizontal, rough, planar, tight 148.5, 148.55, 149.45' - Fractures (3), 5-10 deg, rough, undulating, tight		<ul> <li>below 143.0', 1-2% coverage of voids 1/16" or less, trace cavities (&lt;3/16"), fossils trace to absent</li> <li>143.7-144.0' - variegated moderate yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), fine to medium grained, mild to moderate HCI reaction, very weak to weak (R1 to R2), thinly laminated, possible</li> </ul>	R24: 8 minutes  Drilling ended 16:04 on 4/3/07 at 151.5'
-				149.8' - Fracture, 30 deg, smooth, undulating, tight 150.0 , 150.6' - Fractures (2), 15 deg and 30 deg, rough, undulating, open 151.05' - Fracture, 20 deg, smooth, undulating, tight		intraclasts 1/16" in diameter (light gray), cavities/voids trace to absent, fossils trace to absent, possible carbonaceous/organic material on thin laminae	- - - -



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	B-17	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723177.4 N, 457948.0 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.5	ELS: 2.5 ft bgs on 3/28/07 START: 3/28/2007 END: 4/4/2007 LOGGER: A. Teal, R. McComb						
>00	(9			DISCONTINUITIES		G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEDTH OF CASING
불병은	REN./	(%) Q	F 6	DEPTH, TYPE, ORIENTATION, ROUG	HNESS	OLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
THE THE	ORE NGI	αD	RACT R F	PLANARITY, INFILLING MATERIAL	. AND	'MB(	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SUSIL	SHR	В.	E.E.	THICKNESS, SURFACE STAINING, AND	TIGHTNESS	SΥ	CHARACTERISTICS	DNOI 3, TEST NESSETS, ETC.
							144.0-144.25' - Same as	
							141.5-143.7' except very weak to weak (R1 to R2)	_
-					-		144.25-145.6' - Same as	_
-					-		- 135.25-136.0'	-
-					-		No Recovery 145.6-146.5' Limestone	-
-					-		- 146.5-151.5' - yellowish gray, (5Y	-
-					-		7/2), mild HCl reaction, weak to medium strong (R2 to R3), 3-5%	_
					_		<ul> <li>coverage of voids 1/16" or less on</li> </ul>	_
							surface, some cavities up to 1/8",	_
							poorly fossiliferous (molds/casts)  Bottom of Boring at 151.5 ft bgs on	
							4/3/2007	
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PROJECT NUMBER:	BORING NUMBER:
338884.FL	B-18

SHEET 1 OF 8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723259.1 N, 458027.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.4 ft bo	gs on 4/22	2/07	START : 4/19/2007 END : 4/23/2007 LOGGE	ER : 1	N. Jarzyniecki	
				STANDARD	SOIL DESCRIPTION		COMMENTS	
A PICON	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	OO! NAME HOOG OBOUR OVAIROL OOLOR	-	DEDTH OF CACING PRILLING DATE	
H BE ACE ATIO	RECOVERY (ft)					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	5	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		INSTRUMENTATION	
42.0	0.0				Poorly Graded Sand With Organics (SP)		14:49 Begin drilling, SPT sample, sand is	
-		1.0	SS-1	1-1-1 (2)	0.0-1.0' - olive gray, (5Y 3/2), moist, very loose, very fine to fine silica sand, trace nonplastic fines, 20%	1	silica -	
	1.5			(=)	organics decreasing with depth	$\mathcal{T}$		
						]	_	
_						1	_	
_						4	-	
-						4	-	
-						+	-	
						+	-	
5 37.0	5.0				Clayey Sand (SC)		<del>-</del>	
-		1.2	SS-2	1-2-1	5.0-6.2' - pale blue to grayish blue, (5BP 7/2 to 5BP 5/2), mottling light olive brown (5y 5/6), wet, soft,		-	
-	6.5			(3)	medium plasticity, no dilatancy, 66% fine silica sand	#/	-	
-	0.0					1	<u> </u>	
						1		
						]	_	
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-						1	-	
-						4	-	
10 <u> </u>	10.0				Limestone Fragments	+	-	
-		0.8	SS-3	7-4-3	↑ 10.0-10.4' - dusky yellow, (5Y 6/4), moderate HCl  // // // // // // // // // // // // /	<b>/</b> 411	<del>-</del>	
-	115	0.0	33-3	(7)	\reaction	Æ	-	
-	11.5				10.4-10.8' - grayish yellow, (5Y 8/4), wet, firm, nonplastic, rapid dilatancy, moderate to strong HCI	Ή.	-	
-					reaction, 10 % very fine to medium sand, carbonate	1	-	
_						1	1	
						]		
_						1	_	
-						1	-	
15 <u> </u>	15.0				Silt With Sand And Limestone Fragments (ML)	+	귀 -	
-		1.3	SS-4	26-29-36	15.0-16.3' - Same as 10.5-11.5' except 20% fine to	+	-	
-	40.5	1.3	33-4	(65)	coarse sand-sized, 10-15% coarse sand-sized to fine gravel-sized limestone fragments at top of sample	-	_	
-	16.5					f	-	
-						1	-	
1 -						1	-	
						1		
						1		
-						1	-	
20_						+		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-18	SHEET	2	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723259.1 N, 458027.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

	LEVELS	: 2.4 ft b	gs on 4/22	2/07 S	TART : 4/19/2007 END : 4/23/20	07 LOGGER	: N.	Jarzyniecki
300				STANDARD	SOIL DESCRIPTIO	N	G	COMMENTS
ANG	SAMPLE INTERVAL (ft)  SAMPLE INTERVAL (ft)  RECOVERY (ft)  #TYPE 6"-6"-6" (N)  STANDARD PENETRATION TEST RESULTS  SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY							DEDTIL OF CACING DOULING DATE
ACE ATIO		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIV	E DENSITY OR	30Li	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTUR	E, MINERALOGY	SYME	INSTRUMENTATION
22.0	20.0			(1.1)	Sandy Silt (ML)		П	
-		1.2	SS-5	31-14-12 (26)	20.0-21.2' - Same as 15.5-16.5' excorange, (10Y 7/4), wet, very stiff, no	ept grayish – onplastic_rapid		
-	21.5			(20)	<ul> <li>dilatancy, moderate HCl reaction, 3</li> </ul>	5-40% fine to	Ш	_
-					coarse sand	/ -		_
_								_
_						_		_
-						_		=
25 <u> </u>	25.0				Sandy Silt With Limestone Fragme	ents (MI )	ш	
		10	SS-6	2-3-2	25.0-26.0' - Same as 20.5-21.5' exc	ept firm and		-
-		1.0	33-0	(5)	20-25% fine gravel-sized limestone	fragments	Щ	-
-	26.5					-		-
-						-		-
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_						1		-
_						1		_
30	30.0							
12.0	30.5	0.5	SS-7	50/5.5 (50/5.5")	Sandy Silt (ML)	ent hard mild to	Ш	16:15 Adding 15 more feet of casing to 30.0' below ground surface
-				(00/0.0)	_\moderate HCl reaction, 10% fine gr	avel-sized		Solow ground durides
-					Begin Rock Coring at 31.0 ft bgs See the next sheet for the rock core	· loa		_
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-18

SHEET 3 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723259.1 N, 458027.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.4	ft bas	s on 4	/22/07 START : 4/19/2007 END : 4/	23/20	07 LOGGER : N. Jarzyniecki	
>00	(9			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_	31.0		1	-		Limestone  31.0-36.0' - moderate yellow to light	16:57 Begin rock coring at 31.0' below ground surface -
-			4	31.9' - Bedding plane, 10 deg, rough, undulating, open 1/8" 32.25' - Bedding plane, <5 deg, smooth,		olive gray, (5Y 7/6 to 5Y 5/2), with mottling of the two colors from - 32.8-35.4', very fine grained,	SC-broke during – movement –
-	R1-NQ 5 ft	80	4	planar, tight 32.5' - Mechanical break, 5 deg, rough, undulating, highly fossiliferous		moderate to strong HCl reaction, weak to medium strong (R2 to R3), highly fossiliferous, fossil casts and	]
-	100%		0	32.6' - Bedding plane, 10 deg, smooth, planar, highly fossiliferous, tight 32.9' - Mechanical break, 15 deg, rough,		molds, voids over 50-70% of surface up to 1/16", dissolution cavities up to - 1/2"x2" on 10% of surface	]
35 7.0 -			1	undulating, highly fossiliferous, tight  33.1' - Bedding plane, 10 deg, smooth, planar, highly fossiliferous, tight		<u> </u>	R1: 10 minutes
-	36.0		0	33.5, 33.8' - Bedding plane (2), 30 deg, smooth, planar, tight 33.75, 35.5' - Fractures (2), rough,		36.0-40.7' - dusky yellow to pale olive, (5Y 6/4 to 10Y 6/2), fine	17:07 Begin coring 36.0- 41.0' -
-			0	undulating, tight, high angle fractures		grained, moderate to strong HCl reaction, extremely weak (R0), fine grained silts, fossiliferous, voids up	]
-	R2-NQ 5 ft	0	0	-		to 1/16" on 20% of surface, dissolution zones up to 10% of surface up to 1/2"x1" from 36.0-37.1	
-	94%		0	-		dusky yellow to pale olive (5Y 6/4 to 10Y 6/2), organic layers throughout	
40 2.0 _			0	_	Ħ	<u> </u>	R2: 10 minutes
-	41.0		NR o	-		No Recovery 40.7-41.0' 41.0-42.5, 44.45-45.9' - Same as 36.0-40.7' except 42.5-44.45 light	17:17 Begin coring 41.0- 46.0' -
-			0	-		olive gray to dusky yellow (5Y 5/2 to 5Y 6/4), highly fossiliferous, cavities over 30% of surface, up to 1/16",	SC-1 collected at 42.5-
-	R3-NQ 5 ft	0	1	43.4' - Bedding plane or mechanical break,		medium gray infill (N5) over 20% of surface, organics throughout, weak (R2) rock, moderate HCl reaction	43.3' -
- -	98%		0	silt and/or clay sized infilling, silt infill, open 1" .	Ħ	-	]
-3.0 -	40.0		0	<del>-</del>		-	R3: Run time not recorded
-	46.0		NR / 1	40.71 Padding plans 40.1		<ul> <li>No Recovery 45.9-46.0'</li> <li>Limestone</li> <li>46.0-51.0' - moderate yellowish</li> </ul>	17:27 Drilled 46.0-51.0'
-			3	46.7' - Bedding plane, 10 deg, rough, undulating, tight 47.1, 47.2, 47.6' - Bedding plane (3), 10 deg,		brown, (10YR 5/4), fine to very fine grained, moderate to strong HCl reaction, extremely weak to weak	
-	R4-NQ 5 ft 100%	40	2	rough to smooth, undulating, tight 48.55, 48.9, 49.6' - Bedding plane (3), 10		(R0 to R2), voids up to 1/16" on 10-20% of surface, trace organics on surface	
50	100 /0		2	deg, rough, undulating, tight 47.4, 48.15, 48.5, 49.4, 50.0' - Mechanical	Ħ	-	R4: Run time not recorded 4/20/07 08:21 Retrieved
-8.0 -	51.0		0	break (4) 49.45' - Bedding plane, 30 deg, rough, undulating, tight 50.0' - Mechanical break		<del>-</del> -	R4 — 08:27 Water level at 2.7' _ below ground surface —
				20.0 - Wednamical Dreak			



PROJECT NUMBER:

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BORING NUMBER:

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SHEET 4 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723259.1 N, 458027.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

- L m D C と L スェロー 8 L D C L L L L L L L L L L L L L L L L L						asing		
SEC   Proceedings   Process   Proc	WATER	LEVELS: 2.4	ft bgs	s on 4/		23/20		•
2 2 50.2 - Bedding plane, 10 deg, rough, undulating, undulating, open 14" 50.48' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 61.5' - Fracture, 25.60 e.00 e.g., rough, undulating, bedding plane fractures, open 14" 55.5 - 13.0	>00	[			DISCONTINUITIES	ပ	LITHOLOGY	COMMENTS
2 2 50.2 - Bedding plane, 10 deg, rough, undulating, undulating, open 14" 50.48' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 51.4' - Mechanical break 61.5' - Fracture, 25.60 e.00 e.g., rough, undulating, bedding plane fractures, open 14" 55.5 - 13.0	EPTH BELOV JRFACE AND EVATION (ft	ORE RUN, ENGTH, AND ECOVERY (%	Q D (%)	RACTURES ER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	/MBOLIC LO	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS. TEST RESULTS. ETC.
R5-NO	E S E	8.2	ď	F. F.		S		·
Since   Market   Ma	-			2	undulating, open 1/4" 50.48' - Mechanical break	H	<ul> <li>51.0-51.2, 51.7-52.8, 53.3-54.0,</li> <li>54.9-55.15' - moderate yellowish brown, (10YR 5/4), fine to very fine</li> </ul>	Remark: Core barrel locked 4/21/07 07:55 Core barrel
organics org	-	DE NO		1	51.4' - Mechanical break	Ħ	weak (R2), fossiliferous, voids 1/16"	08:14 Begin setting 6"
13.0   0   0   0   0   0   0   0   0   0	-	5 ft	28	0	bedding plane fractures, open 1/4" 51.8, 52.6' - Fracture (2), 50-60 deg, rough,	上	<ul><li>organics 51.2-51.7, 52.8-53.3, 54.0-54.9,</li></ul>	10:34 Water level 2.1' - below ground surface
Casts   Voids to 1/16" over 20% of surface   Casts   Soids to 1/16" over 20% of surface   Casts   Ca				0			<ul> <li>olive, (5Y 6/4 to 10Y 6/2), fine grained, moderate HCl reaction,</li> </ul>	11:24 Begin coring 51.0- 56.0'
1	-13.0	56.0				H	(casts), voids to 1/16" over 20% of	R5: 11 minutes
R6-NO   5 ft   73%   27   0   0   56.9" - Fracture, 80 deg, tight, not completely broken through broken through broken through broken through   56.4-67.0, 57.15-67.55, 58.5-9.3" moderate yellowish brown, (10YR 5/4), very fine grained, moderate HCI reaction, wellow from (10YR 5/4), very fine grained, moderate HCI reaction, wellow from (10YR 5/4), very fine grained, moderate HCI reaction, wellow from (10YR 5/4), very fine grained, moderate HCI reaction, wellow from (10YR 5/4), very fine grained, moderate HCI reaction, wellow from (10YR 5/4), very fine grained, moderate HCI reaction, with wireline   13.24 Core catcher is not limitation. Sci. 4-67.0, 57.15-57.55, 58.5-9.3" moderate yellowish brown, (10YR 5/4), very fine grained, moderate HCI reaction, surface, post of surface, post of surface, post of surface, post of surface, post of surface, post of surface, post of surface, post of surface, post of surface, post of surface post of surface. Post of surface post of surface post of surface post of surface post of surface post of surface. Post of surface po	-						_ Limestone	
R6-NC   5 ft   73%   27   0   58.3, 58.45, 56.5' - Mechanical break (3)	-			0		Ħ	Same as 51.2-51.7' Limestone	retrieved, washing loose -
1	-	5 ft	27	0	58.3, 58.45, 56.5' - Mechanical break (3)	片	moderate yellowish brown, (10YR 5/4), very fine grained, moderate HCl	
13.30 Begin coring 61.0-66.0'  R6: Run time not recorded  13:30 Begin coring 61.0-66.0'  R6: Run time not recorded  13:30 Begin coring 61.0-66.0'  R6: Run time not recorded  13:30 Begin coring 61.0-66.0'  SC-2 collected at 62.65-63.5'  SC-2 collected at 62.65-63.5'  No Recovery 59.7-61.0'  R6: Run time not recorded  13:30 Begin coring 61.0-66.0'  SC-2 collected at 62.65-63.5'  SC-2 collected at 62.65-63.5'  No Recovery 65.5-66.0'  Limestone  60.0-69.2' - dusky yellow, (5Y 6/4), fine grained, mild HCl reaction, extremely weak (RO), fossiliferous (casts), fine grained with voids up to 1/16" over 20% of surface  R8: 14 minutes	-	73%		0			to R3), voids to 1/8" over 40% of surface, poorly fossiliferous, organic	-
1		64.0		NR	_	H	59.03-59.65' - Same as 51.0-51.2'	R6: Run time not recorded
R7-NO 5 ft 90% 46 0	-	61.0		1	61.5' - Bedding plane, <5 deg, smooth,	$\pm$	-	
R7-NQ 5 ft 90% 46 0 associated bedding plane fractures, open 1/4" 62.9' - Fracture, 65 deg, rough, undulating, open 1/4" 64.2, 62.65, 63.5' - Mechanical break (3) 65.1, 65.25' - Bedding plane (2), <10 deg, rough, undulating, open 1/4" 64.2, 62.65, 63.5' - Mechanical break (2)  R8-NQ 5 ft 100% 37 0 0 0 -28.0 1 1	-			1	62.1, 64.9 - Fracture, 65 deg, rough, undulating, open 1/4"		-	- - SC 2 collected at 62.65
1   62.9 - Fracture, 65 deg, rough, undulating, open 1/4"   64.2, 62.65, 63.5' - Mechanical break (3)	-	5 ft	46	0	associated bedding plane fractures, open 1/4"	Ħ	-	
-23.0	- 65	30,7		1	open 1/4"		-	-
Limestone 66.0-69.2' - dusky yellow, (5Y 6/4), fine grained, mild HCl reaction, extremely weak (R0), fossiliferous (casts), fine grained with voids up to 1/16" over 20% of surface  R8-NQ 5 ft 100%  R8: 14 minutes		66.0				Ħ	No Recovery 65.5-66.0'	R7: Run time not recorded
R8-NQ 5 ft 100% 37 0 0 -28.0 1 1	-	UO.U				井	Limestone - 66.0-69.2' - dusky yellow, (5Y 6/4),	
R8-NQ 5 ft 100% 37 0 0 0 0 R8: 14 minutes	-			0	67.15, 69.55' - Mechanical break (2)		extremely weak (R0), fossiliferous (casts), fine grained with voids up to	-
70 -28.0 1	-	5 ft	37	0		Ħ	1/16" over 20% of surface	]
-28.0 R8: 14 minutes	-	100%		0		Ħ	-	-
				1	-			R8: 14 minutes
		71.0				$\vdash$		_



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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SHEET 5 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723259.1 N, 458027.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

			<u> </u>	IENT . CIVIE 33 3/N 3 10023, HIND TOTALLY, NO TOOLS, HWY C	aonig		ORIENTATION : Vertical
WATER	LEVELS: 2.4	ft bg	s on 4	/22/07 START : 4/19/2007 END : 4/2	23/20	07 LOGGER : N. Jarzyniecki	
>	<u> </u>			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표원한	N. Y. Y.	9	굶		음	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
<b>₽</b> ₹₹		(%) <sub>Q</sub>	FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BO	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
P.R.P.	N N N N N N N N N N N N N N N N N N N	ø	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Σ	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
БОШ	0716	IĽ.	шш		0)		
			2	70.1' - Bedding plane, <5 deg, silt and/or clay sized infilling, open 1/2", dusky yellow (5Y	$\vdash$	69.2-71.0' - moderate yellowish brown, (10YR 5/4), fine to very fine	14:46 Begin coring 71.0- 76.0' –
			-	6/4) silt infill	ш	grained, moderate HCl reaction,	76.0
-				71.2, 71.7' - Fractures (2), <5 deg and 15	╁	weak (R2), laminated bedding, voids	-
-			0	deg, rough, undulating, open 1/4"	╀	- to 1/16" over 20% of surface, trace	_
l _						laminar bedding	_
	R9-NQ			73.0' - Bedding plane, 5 deg, rough,	<b>—</b>	Limestone	
-	5 ft	60	2	undulating, open 1/4", tight	₩	<ul> <li>71.0-73.0' - dusky yellow to pale olive, (5Y 6/4 to 10Y 6/2), strong HCl</li> </ul>	_
-	84%			73.5, 74.9, 75.0' - Mechanical break (3) 73.7, 74.0' - Bedding plane (2), 5 deg, rough,		reaction, weak (R2), voids to 1/16"	-
_			1	undulating, open 1/4", olive gray (5Y 3/2) clay	╀	over <10% of surface, fossiliferous	_
75				infilling	H	(casts), dissolution along fractures,	
-33.0			0			5% cover infill of medium gray (N5)	R9: 5 minutes
-			NR	-	╁	- 73.0-73.7' - dusky yellow, (5Y 6/4),	-
1 -	76.0			-	世	fine grained, moderate HCl reaction, extremely weak (R0), fossiliferous	14:51 Rogin coring 76.0
1 -			0		$\Box$	(casts), voids on 20% of surface to	14:51 Begin coring 76.0- 81.0' -
					$\vdash$	1/16", mottling pale olive (10Y 6/2)	SC-3 collected at 76-76.9'
-	1			-	L	73.7-75.2' - dusky yellow to pale	_
-			1	-	╁	Lolive, (5Y 6/4 to 10Y 6/2), moderate HCl reaction, weak (R2), voids up to	-
_				77.8, 78.9' - Bedding plane (2), 20 deg,	╁┬	1/16" over 30% of surface, clay infill	-
	R10-NQ 5 ft	64	1	rough, undulating, silt zone open 1/4"		in some fractures	
	96%	04	'		Ш	No Recovery 75.2-76.0'	
-				-	H	Limestone	1
-			1				-
80				79.6, 76.9, 80.0' - Mechanical break (3)	₽	dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, extremely	
-38.0			1	80.2' - Fracture, 20 deg, rough, undulating,		weak (R0), fossiliferous (casts),	R10: Run time not recorded -
	81.0		L.	silt and/or clay sized infilling, silt zone open	$\vdash$	voids over 20-30% of surface to	recorded
-	01.0		NR.	1/2"	╁┷	1/16", mottled with light olive gray to	14:58 Begin coring 81.0-
-			1	81.3' - Bedding plane, <5 deg, rough,	ш	yellowish gray (5Y 5/2 to 5Y 7/2) 77.8-78.5, 79.5-79.9' - dusky yellow	83.0'
_				undulating, open 1/4"	ᅪ	to pale olive, (5Y 6/4 to 10Y 6/2),	_
			0	82.25, 83.0, 83.5' - Mechanical break (3)		weak (R2), voids up to 1/16" over	
			0	02.20, 00.0, 00.0 Modification block (0)	ш	30% of surface	_
-	R11-NQ			-	╁	- 79.6-79.7' - moderate HCl reaction,	-
_	5 ft	83	0	-		clay infill No Recovery 80.8-81.0'	-
1 -	90%				$oldsymbol{oldsymbol{\sqcup}}$	- Limestone	_
1				84.0' - Bedding plane, <5 deg, rough,	$\vdash$	81.0-85.5' - dusky yellow to yellowish	
85			1	undulating, open 1/4", associated with fossils and dissolution zones		gray, (5Y 6/4 to 5Y 7/8), very fine to	1
-43.0			1	85.0' - Bedding plane, <15 deg, rough,	╙	— fine grained, mild to moderate HCl	R11: 12 minutes
1 -				undulating, open 1/4"	$\Box$	reaction, weak (R2), voids up to 1/16" on 35-40% of surface.	-
1 -	86.0		NR		F	- fossiliferous (casts, molds),	l
1					$\vdash$	dissolution cavities 83.9-84.4'.	15:30 Begin coring 86.0-
1 -			>10	86.45-86.75' - Fracture zone, rough,	$\Box$	Largest dissolution zone is up to	91.0'
1 -				undulating, intersecting fractures, open	╀	1/2"x1", very weak (R1) to weak (R2) rock, low to moderate HCl reaction	Driller's Remark: Slight
1 -			3	87.1, 87.4' - Bedding plane, <5 deg, rough, undulating, open less than 1/4"	ᡛ	No Recovery 85.5-86.0'	circulation loss at 87.0'
1 -				87.3' - Fracture, 75 deg, rough, undulating,	Ш	Limestone	]
1	R12-NQ			tight	$\vdash$	86.0-87.7' - Same as 81.0-85.5'	
I -	5 ft 34%	9		-	Ľ	No Recovery 87.7-91.0'	1
1 -	J <del>-1</del> /0			-	$oxed{\Box}$	-	-
1 -			NR	-	╆┯	-	-
90							
-48.0					$\vdash$		R12: Run time not
1 -	01.0			-	口	-	recorded -
<u> </u>	91.0				+		-
1					1		
					1		



PROJECT NUMBER:

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BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723259.1 N, 458027.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

CORING	METHOD A	ND E	QUIPM	IENT: CME 55 S/N 316625, mud rotary, NQ tools, HW c	asing		ORIENTATION : Vertical
WATER	LEVELS : 2.4	ft bg	s on 4	22/07 START : 4/19/2007 END : 4/2	23/20	D7 LOGGER : N. Jarzyniecki	
>00	(9			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AN SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-53.0 -53.0	R13-NQ 5 ft 80% 96.0		1 0 >10 >10 NR	92.3' - Bedding plane, <10 deg, rough, undulating, open 1/4" 93.0-93.9' - Fracture zone or mechanical break, smooth to rough, undulating, open up to 1/4", intersecting fractures 93.5-94.4' - Fracture zone or mechanical break, smooth to rough, undulating, open 1/4" 94.55' - Bedding plane, 15 deg, rough, undulating, open 1/4"		Limestone 91.0-95.0' - grayish orange, (10YR 7/4), fine grained, moderate HCI reaction, weak (R2), moderately fossiliferous (casts), voids up to 1/8" over 30% of surface  No Recovery 95.0-96.0'	16:44 Begin coring 91.0-96.0' 16:59 Core drilled to 93.5', drillers remark that core barrel is stuck 17:11 Retrieve core sample 91.0-93.5' 17:20 Set 4" casing 4/22/07 09:38 Water level 2.4' below ground surface 09:52 Begin to set 3" casing 11:18 Core barrel freed (3" casing to 85.0') 13:40 NW casing pulled, setting HW casing to 90.0'
- - - - 100 -58.0	R14-NQ 5 ft 58%	17	<10 1 4 NR	96.0-96.2, 96.7-97.0' - Fracture zone (2), rough, undulating, open 1/4", intersecting fractures  97.6, 98.6' - Bedding plane (2), 10 deg, rough, undulating, tight 97.7, 98.5' - Mechanical break (2) 98.2' - Bedding plane, 10 deg, rough, undulating, tight 98.25, 98.75' - Fracture (2), 50 deg, rough, undulating, with organics in vertical orientation		Limestone 96.0-96.7' - dusky yellow to yellowish gray, (5Y 6/4 to 5Y 7/2), very fine grained, moderate HCI reaction, very weak to weak (R1 to R2), voids to 1/8" over 35-40% of surface 96.7-97.15' - dusky yellow, (5Y 6/4), fine grained, moderate HCI reaction, extremely weak (R0), fossiliferous (casts), voids to 1/16" over 20% of surface, mottled with light olive gray to yellowish gray (5Y 5/2 to 5Y 7/2) 97.15-98.9' - dusky yellow matrix with yellowish gray infill, (5Y 6/4 with 5Y	15:28 4" casing set 15:49 Begin coring 93.5- 96.0' R13: 23 minutes 4/23/07 08:00 Begin coring 96.0-101.0'
- - - - - 105 -63.0	101.0 R15-NQ 5 ft 98%	97	1 0 0	101.7, 104.9' - Mechanical break (2) 101.9' - Bedding plane, 10 deg, rough, undulating, open 1/2" 105.3, 102.4, 103.5, 104.2' - Mechanical break (4) 102.75' - Mechanical break 103.8' - Bedding plane, 10 deg, rough, undulating, tight 104.55' - Bedding plane, <5 deg, smooth, undulating 105.05' - Bedding plane, <5 deg, smooth, undulating, very soft material, open 1/4"		8/1), fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), highly fossiliferous (casts), voids to 1/16" over 30% of surface, dissolution cavities up to 1/4"x1/2", infill over 10-50% of surface (same hardness matrix)  No Recovery 98.9-101.0' Limestone 101.0-102.7' - dusky yellow with light olive gray infill, (5Y 6/4 with 5Y 5/2), moderate HCI reaction, weak to medium strong (R2 to R3), highly fossiliferous (casts), voids to 1/16" over 30% of matrix and over 15% of infill, dissolution cavities to 1/2"x3/4",	08:09 Begin coring 101.0-106.0'  R15: Run time not recorded
    110 68.0	R16-NQ 5 ft 100%	90	0 0 0 2	105.2-105.8' - Fracture zone, smooth to rough, undulating, intersecting fractures, most are high angle, open 1/8"		infill over 10-20% of surface, fine grained 102.7-105.9' - dusky yellow with yellowish gray infill, (5Y 6/4 with 5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), highly fossiliferous (casts), voids to 1/16" over 30% of surface, dissolution cavities to 1/4"x1/2", infill over 15-20% of surface, fine grained No Recovery 105.9-106.0'	08:30 Begin coring 106.0- 111.0' SC-4 collected at 106.0- 107.0'  R16: Run time not recorded



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723259.1 N, 458027.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

				IENT : CIVIE 33 3/N 3 10023, Midd Totally, NQ tools, HW C			ORIENTATION : Vertical
WATER	LEVELS : 2.4	ft bgs	s on 4/		23/20		
≥□≎	<u> </u>			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_			0	110.4, 110.7' - Fracture (2), 50-60 deg, rough, undulating, tight		Limestone - 106.0-111.0' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction,	08:40 Begin coring 111.0- 116.0' -
			0	-		extremely weak to weak (R0 to R2), voids to 1/16" over <20% of surface, highly fossiliferous, dissolution zones	
_	R17-NQ 5 ft 96%	80	0	-		up to 1/2" diameter over < 5% of surface 111.0-115.8' - dusky yellow, (5Y 6/4),	-
115_ -73.0			1	- -		fine grained, strong HCl reaction,  extremely weak to medium strong (R0 to R3), increasing in hardness with depth until 105.2' below ground	R17: Run time not
-75.0	116.0		>10 NR	- 116.0-116.2' - Fracture zone, smooth to		<ul> <li>surface, voids to 1/16" over &lt;20% of surface</li> <li>No Recovery 115.8-116.0'</li> </ul>	recorded - 08:50 Begin drilling 116.0-
-			6	rough, undulating 116.3' - Fracture, 55 deg, rough, undulating, tight		Limestone 116.0-120.7' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction,	121.0' -
-	R18-NQ		0	116.4' - Fracture, 80-85 deg, rough, undulating, tight 116.6' - Bedding plane, 10 deg, rough,		very weak to weak (R1 to R2), voids to 1/8" over <20% of surface, fossilierous	-
_	5 ft 94%	70	0	undulating 118.8, 120.15' - Mechanical break (2)		No Recovery 120.7-121.0' Limestone 121.0-124.5' - Same as 116.0-120.7' 124.5-126.0' - light olive brown with	-
120_ -78.0			0	119.9' - Fracture, 80 deg, smooth, undulating, open, end missing		light olive gray, (5Y 5/6 with 5Y 5/2),  very fine to fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), laminar features	R18: Run time not recorded -
-	121.0		NR 1	- 121.4' - Fracture, 80 deg, rough, undulating, open less than 1/8"		throughout and yellowish gray (5Y 7/2) infill over 15% of surface. Matrix is highly fossiliferous, dissolution	09:09 Begin drilling 121.0- 126.0'
_			0	-		features over 10% of surface up to 1/2"x1/2", voids over 35% of surface up to 1/16" and trace organics, infill is very fine, poorly fossiliferous and <	-
_	R19-NQ 5 ft 100%	62	0	123.5, 125.8, 124.8' - Mechanical break (3)		5% voids 126.0-126.4' - pale olive with light olive gray laminations, (10YR 6/2	SC-5 collected at 123.5- 124.45'
- 125_ -83.0			1	124.5' - Bedding plane, smooth, undulating, dissolution features along outer edges of		with 5Y 5/2), very fine grained, mild HCl reaction, weak (R2), poorly — fossiliferous, no voids Limestone	R19: 10 minutes
-	126.0		3	fracture open 1/4" 125.25' - Fracture, 85 deg, not open 125.85, 125.9' - Bedding plane (2), <5 deg, smooth, planar, tight		126.4-129.6' - light olive brown, (5Y 5/6), same as limestone in 116.0-120.7' except voids over 25%	09:19 Begin drilling 136.0-
			>10	126.0-126.4' - Fracture zone, intersecting fractures, open 1/8", tight 126.75, 127.3, 128.5, 128.7' - Mechanical		of surface up to 1/16" and laminar feature at 127.15-127.0', no voids, poorly fossiliferous, weak (R2) to	131.0'
	R20-NQ 5 ft	40	0	break (4) 127.4-127.55' - Fracture zone, intersecting fractures, open 1/4", softer material		medium strong (R3) rock with  exception of 127.2-127.4' which is strong (R4) rock, moderate to strong HCI reaction	-
-	72%	-	2	127.8, 127.95' - Fracture (2), 60 deg, rough to smooth, undulating, open 1/4" - 129.35' - Fracture, 60 deg, rough to smooth,		No Recovery 129.6-131.0'	-
130 <u> </u>	121.0		NR	undulating, open 1/4" 129.5' - Fracture, 60 deg, smooth, undulating		-	R20: Run time not recorded -
	131.0						



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723259.1 N, 458027.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 2.4	ft bgs	s on 4/	/22/07 START : 4/19/2007 END : 4	/23/20	07 LOGGER : N. Jarzyniecki	
≥∩≘	_ (9			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
AACE	TH, OVEF	(%) 🛭	TE O	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ĭ S	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
TEN H	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	₹WE	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ДОШ	0715	ď	ша		<i>S</i>	Limestone	09:34 Begin drilling 131.0-
_			>10	131.15, 132.1, 132.8' - Bedding plane (3), <5 deg, smooth, planar, open <1/8"	丰	<ul> <li>131.0-132.2' - pale yellowish brown,</li> </ul>	136.0'
_				131.4, 133.2, 134.0' - Mechanical break	世	(10YR 6/2), fine grained, moderate to strong HCl reaction, weak to medium	-
_			4	131.7-132.0' - Fracture zone, smooth to rough, undulating, intersecting fractures,	₽	strong (R2 to R3), voids to 1/8" over	-
_	D04 NO			open 1/4"	$\perp$	20-25% of rock, fossil casts to 3/8"x3/4" over 5% of rock as casts	-
_	R21-NQ 5 ft	10	3	132.6' - Bedding plane, <5 deg, smooth, planar, open 1/4"	<u></u>	– (voids)	_
_	64%		1	133.45, 133.6' - Fracture zone (2), 60-70 deg,	$\perp$	132.2-134.2' - grayish orange, (10YR 7/4), fine grained, moderate HCl	-
_			_1_	rough, undulating, open 1/4" on 133.45' 133.6' - Fracture, 60-70 deg, rough,	F	- reaction, weak to medium strong (R2	_
135			NR	undulating, open 1/4"	井	to R3), voids to 1/16" over <10% of surface	DO4 D 11 1
-93.0			IVIX	133.8' - Bedding plane, <5 deg, rough, undulating, tight	$\vdash$	- No Recovery 134.2-136.0'	R21: Run time not recorded –
_	136.0			133.9' - Fracture, <5 deg, rough, undulating,	₽		
_			3	tight 134.0' - Fractures, <5 deg, smooth, planar,	$\perp$	<b>Limestone</b> - 136.0-139.7' - grayish orange, (10YR	09:50 Begin drilling 136.0- 141.0'
_				open 1/4"	上	7/4), fine to medium grained,	_
_			1	135.7' - Bedding plane, <30 deg, smooth, undulating, open 1/4"	$\perp$	moderate HCl reaction, weak (R2), voids to 1/8" over 30-40% of surface,	_
_				136.0-136.3' - Bedding plane, <5 deg,	F	fossil casts (voids) to 5/16" diameter	_
_	R22-NQ 5 ft	53	1	smooth, planar, tight 136.5, 136.6' - Bedding plane (2), 10 deg.	#	over 5% of surface	_
_	74%			rough, undulating, open 1/4"		_	_
_			0	137.5' - Fracture, 50 deg, smooth, undulating, tight	₽	_	_
140				138.4' - Mechanical break		No Recovery 139.7-141.0'	
-98.0			NR	138.5, 137.9' - Mechanical break (2) 138.7' - Bedding plane, <30 deg, smooth,	上	<del>-</del>	R22: Run time not recorded
_	141.0			undulating, open 1/4"	上		
_			>10	141.2-141.35' - Fracture zone, pieces to	$\perp$	Limestone - 141.0-143.7' - light olive gray mottled	10:06 Begin drilling 141.0- 146.0'
_				2"x1", open 1/4"	F	with yellowish gray, (5Y 6/1 mottled	SC-6 collected at 141.4-
_			>10	142.3-142.49' - Fracture zone, pieces to		with 5Y 7/2), fine to medium grained, moderate HCl reaction, weak to	142.3'
_				1"x1/2", open 1/4" 142.9-143.05' - Fracture zone, pieces to	上	medium strong (R2 to R3), voids up	_
_	R23-NQ 5 ft	55	>10	1-1/2"x1/2", open 1/4"	#	to 1/16" over 10-25% of surface, trace fossils up to 1/2"x1/4", cavities	_
_	84%			143.2' - Bedding plane or mechanical break, 20 deg, rough, undulating, organic dark stain,		to 1"x1/2" over 5-20% of surface 143.7-145.2' - olive gray, fine	_
_			1	open 1", associated with cavities	上	grained, moderate HCl reaction,	-
145 -103.0				143.7-143.95' - Fracture zone, pieces to 1"x1/2", open 1/4"	1	medium strong (R3), trace voids to 1/8", trace fossils to 3/16"x1/16", dark	D00: 04it
-103.0			_1 NR	144.55' - Bedding plane, 50 deg, smooth,	╁	- 1/16" laminations (wavy) over 5-10%	R23: 34 minutes
-	146.0		1417	undulating, tight 145.0' - Fracture, <5 deg, smooth,	F	of surface No Recovery 145.2-146.0'	10:40 Bogin drilling 146.0
-			1	undulating, open 1/2"	F	_ Limestone	10:40 Begin drilling 146.0- 151.0' -
-				146.95' - Fracture, 20 deg, smooth,	上	146.0-147.9' - grayish orange, (10YR 7/4), fine to medium grained,	
-			2	undulating, tight	₽	<ul> <li>moderate HCl reaction, weak to</li> </ul>	
-	DO4 NO			147.65' - Bedding plane, 0-5 deg, smooth, planar, tight	$\perp$	medium strong (R2 to R3), voids to 1/8" over 0-40% of surface in	-
-	R24-NQ 5 ft	33	2	147.9' - Bedding plane, smooth, undulating,	口	_ interbedded nature interchanging	10:51 Finish drilling
-	56%			open 1/4" 148.3, 148.35' - Fractures (2), 50 deg,	上	every 3-1/8", trace fossil casts to 1/8"x9/16"	10:51 Finish drilling
-				smooth, undulating, tight, open 1/2"	+	-	R24: Run time not recorded -
150_ -108.0			NR	-	F	_	Used 17 bags of quick cement for abandonment
-100.0					片	_	(47-lbs/bag) and about 60
	151.0				$\vdash$		gallons of water



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-18	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723259.1 N, 458027.2 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.4	4 ft bas	s on 4	/22/07 START : 4/19/2007	END : 4/2		D7 LOGGER : N. Jarzyniecki	
				DISCONTINUITIES			LITHOLOGY	COMMENTS
AND AND (ft)	, AN N		ES	DESCRIPTION		CLO	ROCK TYPE, COLOR,	SIZE AND DEDTH OF CASINO
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUG PLANARITY, INFILLING MATERIAL THICKNESS, SURFACE STAINING, AND T	HNESS, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
BEEN CONTRACTOR OF CONTRACTOR	CORI LENC RECC RECC RECC	RQI	FRAC PER PER PER PER PER PER PER PER PER PER	PLANARITY, INFILLING MATERIAL THICKNESS, SURFACE STAINING, AND T	AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS  147.9-148.8' - moderate yellowish brown, (10YR 5/4), medium to coarse grained, moderate HCI reaction, weak (R2), voids to 1/16" over 40% of surface, trace fossils to 3/16"x1/16"  No Recovery 148.8-151.0'  Bottom of Boring at 151.0 ft bgs on 4/23/2007	DROPS, TEST RESULTS, ETC.
					_			



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-19	SHEET	1	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723369.6 N, 458134.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 4.25 ft l	ogs on 5/2	22/07	START : 5/21/2007
>00				STANDARD	SOIL DESCRIPTION g COMMENTS
N N N	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR  MOISTURE CONTENT, RELATIVE DENSITY OR  DRILLING FUEL TO CASING, DRILLING FUEL TO CASING FUEL
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
41.3	0.0				Topsoil
		0.7	SS-1	1-1-2 (3)	\ \ 0.0-0.25' - brownish black, (5YR 2/1), wet, very loose, \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-	1.5			. ,	\fine silica sand   Poorly Graded Sand With Organics (SP)   -
-					0.25-0.55' - brownish black. (5YR 2/1), wet, very
-					loose, very fine to fine grained, 40% organics, silica sand
-	-				Poorly Graded Sand (SP)   0.55-0.7' - very pale orange, (10YR 8/2), wet, very
-					loose, fine grained, trace nonplastic fines, trace   -
-					organics, silica sand
5	5.0				<u> </u>
36.3	0.0				Silty Sand (SM)  Driller's Remark: Set 5' HW surface casing
-		1.2	SS-2	5-5-4 (9)	5.0-6.15' - grayish orange, (10YR 7/4), wet, loose, fine grained, 15% nonplastic fines, trace organics (roots),
	6.5			(0)	silica sand, soil grades to sandy fat clay with 30-40%
					Time sand at bottom of sample
_					<u> </u>
-					
-					-
-					-
- 10	400				-
10 <u> </u>	10.0				Silt (ML) Driller's Remark: Set 5' HW casing (10'
-	1	0.8	SS-3	14-17-14	10.0-10.75' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction,
-	11.5			(31)	trace roots, carbonate derived
					]
_					<u> </u>
-					1 1
-					-
-	-				
45	15 ^				
15 <u> </u>	15.0				Silt (ML)
-	1	1.2	SS-4	22-47-42	15.0-16.2' - Same as 10.0-10.75' except strong HCl reaction, 10-15% coarse sand-sized to fine
-	16.5			(89)	gravel-sized limestone, all carbonate
					]
					]
-					]
-	-				
-	-				-
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20					



PROJECT NUMBER:	BORING NUMBER:					
338884 FI	R_10	CHEET	2	ΩE	40	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723369.6 N, 458134.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-7/8" tri-cone bit ORIENTATION: Vertical

DRILLIN	IG METH	OD AND	EQUIPM	<u>ENT : CME 550 S</u>	S/N 186073, mud rotary,	, cathead, NW rods, 4-7/8" tri	i-cone bit		ORIENTATION : Vertical
WATER	LEVELS	: 4.25 ft l	ogs on 5/2	22/07	TART : 5/21/2007	END: 5/23/2007	LOGGER	: C.	Wallestad
1.				STANDARD		SOIL DESCRIPTION		(1)	COMMENTS
SQ (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				SYMBOLIC LOG	
HH H		RECOVE	RY (ft)	TEOT REGUETO		USCS GROUP SYMBOL, CO		CIC	DEPTH OF CASING, DRILLING RATE,
YFA YFA VATE			#TYPE	6"-6"-6"		ONTENT, RELATIVE DENSI ', SOIL STRUCTURE, MINEF		MBC	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (#)			#1117	(N)		, ,		SY	
21.3	20.0				Silt With Limesto	one Fragments (ML)			
_		1.0	SS-5	3-25-17	20.0-21.0' - grayis (10VR 6/2 and 10	sh orange and pale yellowis YR 7/4), pale orange mottl	sh brown, -		-
-	24.5			(42)	hard, nonplastic, s	strong HCl reaction	iiig, wet,		·
-	21.5								-
-	-						-		-
-	-						-		-
-	-						_		-
-	1						_		-
-									
_	]								Driller's Remark: Hard at 24' below ground surface -
25	25.0								Surface
16.3					Silt With Sand (M		houd	$\prod$	]
-	1	1.2	SS-6	13-13-17 (30)	nonplastic rapid of	sh orange, (10YR 7/4), wet dilatancy, moderate to stro	i, nard, – ng HCl		<u> </u>
-	26.5			(30)		fine to coarse sand-sized,	all /	Ш	·
-	20.0				\carbonate		/ -		<u>-</u>
-	1						-		-
-	-						-		-
-	-						-		-
-							-		-
_							_		-
_							_		-
30	30.0								_
11.3		0.0	SS-7	50/1.5 (50/1.5")	No Recovery 30.0	0-30.1'			]
				(30/1.3)					
_	]						_		<u> </u>
_	1								<u> </u>
-	1						_		<u>-</u>
-	-								-
-	-						-		-
-	1						-		-
-	-						-		-
35 6.3	35.0				Silt With Sand (M	AI \			
- 0.5	-			13-19-26	Silt With Sand (N 35.0-36.4' - mode	rate vellowish brown. (10Y	′R 5/4),		-
-		1.4	SS-8	(45)	wet, hard, nonplas	stic, rapid dilatancy, moder	rate to		
_	36.5					on, 20-25% fine to coarse s onts to 1/4" at top of sample		Ш	-
_					carbonate				_
1							1		]
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-19	SHEET	3	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723369.6 N, 458134.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-7/8" tri-cone bit

						ary, carreau, NVV 1005, 4-77		ъ.	Wellested	0.000
WATER	LEVELS	: 4.25 ft b	ys 011 5/2		START : 5/21/2007	END: 5/23/2007 SOIL DESCRIPTION	LUGGE	Т	. Wallestad COMMENTS	
≥6€	SAMPLE	INTERVA	l (ft)	STANDARD PENETRATION		JOIL DESCRIPTION		1	SOMMERTO	
DEPTH BELOW SURFACE AND ELEVATION (#)	JAWIF LE	RECOVE		TEST RESULTS		IE, USCS GROUP SYMBOL			DEPTH OF CASING, DRILLING R.	
THE		RECOVE		011 011 011		E CONTENT, RELATIVE DE ICY, SOIL STRUCTURE, M		9	DRILLING FLUID LOSS, TESTS, A INSTRUMENTATION	AND
DEP SUR ELE			#TYPE	6"-6"-6" (N)	CONSISTEN	IOT, SOIL STRUCTURE, W	INCINALOGI	3	INSTRUMENTATION	
1.3	40.0	0.8	SS-9	30-50/4	Silt With Sand	I (ML)	(D 0/0)	T		
-	40.8	0.0	00-0	(80/10")	40.0-40.75° - da	ark yéllowish orange, (10 icity, rapid dilatancy, mod	YR 6/6), wet, erate to	41	-	1
-					∖ strong HCl rea	ction, 25% fine to coarse	grained sand, /	1		1
					\all carbonate			1		1
								1		1
								1		1
_								1		1
-								1		1
-								1		1
45	45.0							1		1
-3.7					Silt With Sand		(40)(D.5(4)	T	1	
-		1.4	SS-10	27-29-50/5.5 (79/11.5")		oderate yellowish brown, ( plastic, rapid dilatancy, m		1		1
-	46.5			(19/11.5)	strong HCl rea	ction, 15% fine to coarse	sand-sized,	1	]	_
-					trace gravei-siz	zed, all carbonate	/	1		1
								1		1
								1		1
-								1		1
-								1		1
-								1		_
50	50.0							1		1
-8.7		0.5	SS-11	41-50/2	Silt (ML)		(10)(5,5(4)	T	Driller's Remark: Hard rock 50.0-55	.0', run
-	50.7	0.0		(91/8")		oderate yellowish brown, ( plastic, rapid dilatancy, m		7	time 15-20 minutes	_
					reaction, 10%	fine to coarse grained sar		1		1
					\carbonate			1		1
_								1		1
_								1		1
-								1		1
-								1		1
								1		1
55	55.0							1		1
-13.7	55.3	0.3	SS-12	50/4	Silt (ML)	50.0.50.51		#	Finished drilling at 17:30 on 5/21/07	at 55.0'
1 -				(50/4")	\55.0-55.25' - S	same as 50.0-50.5'	/	1	below ground surface	1
								1	Resume drilling at 07:52 on 5/22/07	1
								1		1
								1	Water level at 07:35 is 4.25' below	ground
								1	surface	1
								1		1
1 -								1		_
								1		
60								1		
							_	T		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-19	SHEET	4	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723369.6 N, 458134.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-7/8" tri-cone bit

WATER	LEVELS	: 4.25 ft b	ogs on 5/2	22/07	START : 5/21/2007 END : 5/23/2007	LOGO	GER	: C.	Wallestad
>				STANDARD	SOIL DESCRIPTION			Ğ	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS				SYMBOLIC LOG	
ACE TIOI		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, O MOISTURE CONTENT, RELATIVE DENS	COLOR, SITY OR		OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
HAFF EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINE	ERALOGY		YMB	INSTRUMENTATION
<u>ਠੋਲਜ਼</u> -18.7	20.0	0.2	SS-13	(N) 50/3.5	─ Limestone Fragments And Silt (ML)		_	Ś	Driller's Demark: 10 159/ less in sirgulation
-10.7	60.8	0.2	33-13	(50/3.5")	\ 60.0-60.2' - dark vellowish orange. (10YR)	6/6),	Л		Driller's Remark: 10-15% loss in circulation at 60.5'
-					nonplastic, mild to moderate HCl reaction, carbonate	all	/-		Driller's Remark: Hard drilling at 61.0', will
_							Щ		switch to rock coring
-					Begin Rock Coring at 61.5 ft bgs See the next sheet for the rock core log		4		_
-					3		_		_
_	1						4		_
_							_		_
_							_		_
_							4		_
65									
-23.7							4		_
_							4		_
_							4		_
_							4		_
_	1						4		_
_							_		_
_	1						_		_
-							4		_
-							4		_
70 <u> </u>							_		
-28.7							4		_
_	1						_		_
-	1						4		_
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-33.7	_						4		=
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-19	SHEET	5	OF	10

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723369.6 N, 458134.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88)  $DRILLING \underline{\ CONTRACTOR: Universal\ Engineering\ Sciences,\ Gainesville,\ FL;\ Driller:\ M.\ Boatright;\ Cathead\ Operator:\ G.\ Davis$ 

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 4.25 ft bgs on 5/22/07 START: 5/21/2007 END: 5/23/2007 LOGGER: C. Wallestad DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) DESCRIPTION FRACTURES PER FOOT ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE, WEATHERING, HARDNESS, RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS 5/22/07 start coring at 61.5 Limestone 61.5-66.05' - dark yellowish orange, 1 62.1' - Mechanical break or bedding plane, Driller's Remark: Cored (10YR 6/6), fine to medium grained, horizontal, smooth, undulating, tight moderate HCI reaction, extremely fast (soft) at 62.0-63.0' weak to weak (R0 to R2), voids to 1/8" diameter over 0-30% of rock 1 63.4, 63.5' - Bedding plane or mechanical (mostly 25%), trace fossil casts to R1-NQ break (2), horizontal, smooth, undulating, 5 ft 91% 88 1 3/16" diameter, no visible cavities, tight to 1/2" open trace dark (possibly organic) inclusions and laminations 65 0 -23 7 R1: 5 minutes 0 No Recovery 66.05-66.5' NR 66.5 Limestone 66.5-68.9' - moderate yellowish brown, (10YR 5/4), fine to medium 1 66.9' - Mechanical break or bedding plane, horizontal, smooth, undulating, tight grained, moderate HCI reaction, 0 weak to medium strong (R2 to R3), voids to 1/8" over 5-20% of rock, trace fossil casts up to 5/16" R2-NC 0 diameter, no visible cavities, trace 5 ft 85% 83 Driller's Remark: Very soft 69.05' - Mechanical break or bedding plane, dark gray fine grained inclusions at 69.0-70.5' horizontal, smooth, undulating, tight 68.9-69.75' - grayish orange, (10YR 7/4), fine to medium grained, strong 70 69.75' - Bedding plane, horizontal, smooth, 3 -28.7 HCl reaction, extremely weak to very undulating, tight to 1/2" open 70.25' - Fracture, 45 deg, smooth, undulating 0 weak (R0 to R1), voids to 1/8" over R2: 7 minutes to planar, tight 20-30% of rock, trace fossil NR casts/molds to 3/16" diameter, no 715 visible cavities, trace dark (possibly organic) particles 0 69.75-70.75' - moderate yellowish brown, (10YR 5/4), fine to medium 0 grained, moderate HCI reaction, Driller's Remark: 25% weak to medium strong (R2 to R3), voids to 1/8" over 15-20% of rock, NR circulation loss at 73.0-R3-NQ 74 0' extremely soft fossil casts to 3/8" over 5-10% of 5 ft 70 possible silt-filled cavity rock, no visible cavities 74% 0 No Recovery 70.75-71.5' Limestone 1 74.9' - Mechanical break, 0-80 deg, rough, -33 7 71.5-72.75' - grayish orange, (10YR undulating, tight, related to cavities 7/4), fine to medium grained, R3: 10 minutes 75.65' - Fracture, 45 deg, rough, undulating, moderate HCI reaction, medium 1 2" thick silty gravely infill, tight strong (R3), voids to 1/8" over 76.5 20-30% of rock, fossil casts to 9/16" over 10-15% of rock, no visible 1 cavities No Recovery 72.75-74.15' 77.35' - Bedding plane or mechanical break, horizontal, smooth, undulating, associated Limestone 0 with cavity, tight to 1" open 74.15-75.6' - pale yellowish brown, (10YR 6/2), fine grained, strong HCI Driller's Remark: Soft rock R4-NC reaction, medium strong (R3), trace 78.75' - Bedding plane, 10 deg, smooth, 80 1 78.5-81.5' 5 ft voids, cavities to 2" diameter most undulating, tight 100% with infill, trace fossil casts to 3/8"x3/16". infill is moderate 80 0 yellowish brown, (10YR 5/4), medium -38.7 grained, weak (R2), voids up to 3/16' R4: 4 minutes over 40% of infill 2 81.5



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-19	SHEET	6	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723369.6 N, 458134.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

	LEVELS : 4.2			5/22/07 START: 5/21/2007 END: 5/	23/20	D7 LOGGER : C. Wallestad	
				DISCONTINUITIES	ß	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			0	81.1' - Bedding plane or mechanical break, horizontal, rough, undulating, tight 81.3' - Bedding plane or mechanical break, horizontal, rough, undulating, tight		Silt With Limestone Fragments (ML)  75.6-75.8' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, compacted, carbonate	Driller's Remark: Lost 95% circulation at 81.5' - SC-1 collected at 81.5-82.8'
-			0	nonzontal, rough, undulating, tight	H	Limestone 75.8-76.5' - moderate yellowish	-
-	R5-NQ 5 ft 100%	98	1	84.2' - Mechanical break, horizontal, rough,		brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), voids to 1/8" over	Driller's Remark: Soft rock at 83.5-85.0'
85_ -43.7			0	undulating, associated with cavities, tight to 1" open —		10-20% of rock, trace fossil casts to  3/16"x1/8", no visible cavities 76.5-81.5' - moderate yellowish	_
-	86.5		0		H	brown, (10YR 5/4), fine to medium grained, moderate to strong HCl reaction, weak (R2), very weak (R1)	R5: 7 minutes
-			0			at 78.6-78.9' and 81.1-81.3', voids to 1/16" over 15% of rock to 78.6' and over 40% rock below 78.6', trace	Driller's Remark: 100% circulation lost at 86.5'
-			0		F	fossil casts to 3/8" diameter, trace cavities to 3/8" x 1-9/16" increasing to cover 10-15% of rock at	SC-2 collected at 87.5- 88.55' -
-	R6-NQ 5 ft 70%	70	1	88.5' - Fracture, 10 deg, rough, undulating, dark stain, tight		80.4-81.1', trace dark laminations in very weak rock sections, dark fat clay layer 3/8" thick at 78.7'	Driller's Remark: Very soft at 88.5-90.0'
90_ -48.7			0	-	H	<ul> <li>81.5-86.5' - moderate yellowish</li> <li>brown, (10YR 5/4), fine grained, moderate to strong HCl reaction,</li> </ul>	-
-	91.5		NR		H	<ul> <li>weak to medium strong (R2 to R3),</li> <li>voids to 1/8" over 10-20% of rock (decreasing in percent coverage with</li> </ul>	R6: 11 minutes
_			>10	91.5-91.9' - Fracture zone, rounded fragments to 1-1/2" diameter, compacted silts in zone		depth), cavities to 2" x 1-3/16" over 40% of rock at 83.5-84.5' (open cavities) otherwise trace cavities to	Driller's Remark: Very soft
_			10	92.4' - Fracture, 60 deg, smooth, undulating, tight 92.55' - Fracture, 75 deg, smooth, undulating,		1-3/16" x 3/4" with light gray fine grained infill, fossil casts comprise most of cavities	at 92.0-93.5' -
-	R7-NQ 5 ft 56%	9	2	tight 93.0' - Fracture, 30 deg, smooth, planar, tight 93.2-93.45' - Fracture zone, fragments to		86.5-90.0' - very pale orange grading to moderate yellowish brown with depth, (10YR 8/2 to 10YR 5/4), fine	}
95 -53.7			NR	1-1/2" x 1" 93.75' - Fracture, <10 deg, smooth, undulating, tight	Ħ	grained, moderate to strong HCI reaction, medium strong (R3), voids to 1/8" over 15-30% of rock, trace cavities to 1-3/16" x 3/8" at 89.8'.	Driller's Remark: Soft at 94.5-95.5'
-	96.5			94.05' - Fracture, 15 deg, smooth, undulating, tight	Ħ	trace fossil casts to 3/8" diameter, trace dark (possibly organic)	R7: 6 minutes  Driller's Remark: Soft at
-			>10	96.5-97.0' - Fracture zone, fragments to 1-1/2" diameter 97.2' - Bedding plane, horizontal, smooth,		inclusions No Recovery 90.0-91.5' Silt (ML)	96.0-96.5'
-			2	undulating, tight to 1/4" open 97.5' - Bedding plane, horizontal, smooth,		91.5-91.9' - grayish orange, (10YR 7/4), very strong HCl reaction,	]
-	R8-NQ 5 ft	8		undulating, tight to 1/4" open 97.65' - Bedding plane, horizontal, smooth, undulating, tight to 1/4"open		compacted	
100 -58.7	30%		NR	- -		_	Driller's Remark: 99.5- 100.0' only resistance in —
-						-	run _ R8: 3 minutes _
	101.5				$\vdash$		



PROJECT NUMBER:

338884.FL

B-19

SHEET 7 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723369.6 N, 458134.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS : 4.2	25 ft b	gs on	5/22/07 START : 5/21/2007 END : 5/	23/20	D7 LOGGER : C. Wallestad	
<b>₹</b> □₽	(%)			DISCONTINUITIES	<sub>D</sub> G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-	R9-NQ 5 ft 100%	52	3 >10 0	102.0' - Fracture, 60 deg, smooth, undulating, open (missing opposite face) 102.1' - Bedding plane, horizontal, smooth, undulating, open (missing opposite face) 102.4-102.8' - Fracture zone, fragments to 2" x 1-1/2"		Limestone 91.9-93.15' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCI reaction, medium strong (R3), in cavity infill, medium grained infill: voids to 1/8" over 5-15% of rock, cavities to 2" diameter over 35-45% of rock, trace fossil casts to 3/16" diameter, cavity infill is grayish orange (10YR 7/4), medium grained,	SC-3 collected at 102.8- 104.0'
105_ -63.7 -	106.5		>10	104.8' - Bedding plane or mechanical break, — horizontal, smooth, undulating, tight 105.1-105.8' - Fracture zone, fragments to 1" diameter 106.05' - Fracture, 50 deg, smooth, undulating, fight to poon 1/2"			Driller's Remark: Soft to 105.5' R9: 7 minutes
- - - - 110	R10-NQ 5 ft 85%	66	>10 2 0	undulating, tight to open 1/2" 106.3-106.5' - Fracture zone, fragments to 1/2" diameter 106.5-106.6' - Fracture zone, fragments to 1-1/2" diameter 107.2-107.55' - Fracture zone, fragments to 2" diameter		<ul> <li>R1), voids to 1/8" over 5-15% of rock, trace cavities to 9/16" diameter, with extremely weak (R0) infill, fossil casts to 3/16"x3/8" over 5-10% of rock</li> <li>No Recovery 94.3-96.5'</li> <li>Limestone 96.5-98.0' - very pale orange, (10YR 8/2), fine to medium grained, strong HCI reaction, weak to very weak (R1</li> </ul>	Driller's Remark: Fairly soft at 106.5-109.0' - - - - - -
-68. <del>7</del> - -	111.5		1 NR	110.3' - Bedding plane, horizontal, smooth, undulating, tight to 1/2" open 110.55' - Fracture, 60 deg, smooth, undulating, tight		to R2) in cavities, voids to 1/16" over 5-10% of rock, no visible cavities, fossil casts to 3/4" diameter over 10-15% of rock No Recovery 98.0-101.5' Limestone	R10: 5 minutes  Driller's Remark: Soft at 111.0-111.5'
- - - -	R11-NC 5 ft 98%	98	1 1 0	112.0' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight  113.05' - Bedding plane, horizontal, smooth, undulating, tight		101.5-106.5' - pale yellowish brown, (10YR 6/2), fine to medium grained, strong HCl reaction, weak to very weak (R2 to R1), voids to 1/16" over 10-15% of rock, no visible cavities, trace fossil casts and molds to 3/16" diameter	Driller's Remark: Soft at 112.0-116.5'
-115 -73.7 -	116.5		2	114.75' - Bedding plane, horizontal, rough, undulating, tight 115.15' - Bedding plane, horizontal, smooth, undulating, tight 116.3' - Fracture, 45 deg, smooth, undulating,		<ul> <li>106.5-107.55' - very pale orange, (10YR 8/2), fine to medium grained, strong HCl reaction, very weak (R1), trace voids to 1/16", elliptical fossil molds to 1/16" over 25-30% of rock, no visible cavities</li> <li>107.55-110.75' - moderate yellowish</li> </ul>	R11: 4 minutes
- -			0	tight 117.05' - Bedding plane, horizontal, rough, undulating, tight		brown, (10YR 5/4), fine to medium grained, moderate HCl reaction, very weak to weak (R1 to R2), voids to 1/8" over 15% of rock, trace fossil casts to 3/16" diameter, no visible	- - -
- 120 -78.7	R12-NG 5 ft 99%	   78 	3	118.6, 118.75, 118.9, 119.15, 119.55, 119.65, 119.95' - Bedding plane (7), horizontal, smooth, undulating, tight		cavities No Recovery 110.75-111.5' Limestone 111.5-113.05' - Same as 107.55-110.75' except trace cavities to 3/4"-1-3/16" 113.05-114.35' - Same as	
<u>-</u>	121.5		0			106.5-107.55' except trace fossil molds to 3/16"x3/8" from 113.05-113.3'	R12: 6 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-19	SHEET	8	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723369.6 N, 458134.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

<u>WATE</u> R	LEVELS: 4.2	5 ft bo	gs on t	5/22/07 START : 5/21/2007 END : 5/2	23/20	D7 LOGGER : C. Wallestad	
				DISCONTINUITIES	ŋ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_			NR) 6	121.9, 122.1, 122.25, 122.35, 122.4, 122.5' - Bedding plane (6), horizontal, smooth, planar		Limestone - 114.35-115.5' - very pale orange, (10YR 8/2), fine to medium grained,	Driller's Remark: Soft at 120.5-121.5' - Driller's Remark: Soft at
-			0	to undulating, tight - -		strong HCl reaction, very weak (R1), voids to 3/16" over 25% of rock, no visible cavities, fossil casts and	122.0-123.0'
-	R13-NQ 5 ft 100%	89	0	-	Ħ	molds to 3/16"x9/16" over 0-10% of rock decreasing in coverage with depth	-
125 -83.7 -			0	_		115.5-116.2' - pale yellowish brown — with moderate yellowish brown mottling, (10YR 6/2 with 10YR 5/4), medium grained, strong HCl	
-	126.5		0	-	Ė	reaction, very weak to weak (R1 to R2), voids to 1/8" over 15% of rock, fossil casts and molds to 3/8"	R13: 6 minutes SC-4 collected at 125.65- 126.5'
- -			3	126.6' - Bedding plane, horizontal, smooth, undulating, tight to 1/4" open  127.4' - Bedding plane, horizontal, smooth,		<ul> <li>diameter over approximately 5% of rock, no visible cavities</li> <li>116.2-116.7' - Same as</li> </ul>	-
-	R14-NQ		1	planar to stepped, tight to 1/4" open 127.45' - Fracture, vertical, smooth, undulating, tight		<ul> <li>106.5-107.55' except trace fossil casts and molds to 3/16"x3/8"</li> <li>116.5-117.3' - Same as</li> </ul>	-
- - 130	5 ft 77%	45	10	127.5' - Bedding plane, horizontal, smooth, planar to stepped, tight to 1/4" open 129.2' - Fracture, 20 deg, smooth, undulating,	H	_ 114.35-115.5' except cavities (fossil casts) to 3/4" diameter over approximately 30% of rock from	- Driller's Remark: Soft at
-88.7 -			10	tight to 1/4" open 129.4-129.55' - Fracture zone, fragments to 1" diameter 129.55, 129.85' - Bedding plane (2),		116.7-117.3' 117.3-119.55' - grayish orange, (10YR 7/4), fine grained, weak (R2), trace voids to 1/16", no visible	129.5-130.0' — R14: 5 minutes
-	131.5		NR	horizontal, smooth, planar to stepped, tight to 1/4" open 129.9-130.0' - Fracture zone, fragments to	Ė	cavities, trace fossil casts and molds to 3/16" diameter 119.55-120.3' - Same as	Driller's Remark: Soft at 130.5-131.0' - Stop coring for the day at
-			4	1/2" x 1-1/2", horizontal bedding planes 129.9, 130.0, 130.1, 130.25' - Bedding plane (4), horizontal, smooth, planar to stepped,		117.3-119.55° except increasing void coverage to 5-20% of rock and increase in fossil coverage to 5-10%	16:55 on 5/22/07  Begin coring for the day at - 07:52 on 5/23/07
-	R15-NQ		1	tight to 1/4" open 131.6, 131.7, 132.1' - Bedding plane (3), horizontal, smooth, planar to undulating, tight		120.3-120.9' - Same as 115.5-116.2' - except fossil coverage consistent 5-10%	-
135	5 ft 80%	54	10	132.0' - Mechanical break 133.3, 133.7' - Fracture or mechanical break (2), <10 deg, rough, undulating, tight		120.9-121.45' - Same as - 107.55-110.75' <b>No Recovery 121.45-121.5'</b>	
-93. <del>7</del> -			NR	133.9-134.0' - Fracture zone, fragments to 1" diameter - 133.9, 134.0' - Bedding plane (2), horizontal,		Limestone 121.5-122.25' - pale yellowish brown, (10YR 6/2), fine grained, strong HCl	R15: 9 minutes
_	136.5		2	smooth, planar to undulating, tight 134.05' - Mechanical break or fracture, vertical, rough, undulating, tight		reaction, medium strong (R3), interbedded with limestone that is the same as 107.55-110.75', no visible	Driller's Remark: Hard except 136.0-136.5'
- -			1	134.5' - Bedding plane, horizontal, smooth, planar to undulating, tight 134.65' - Mechanical break or bedding plane, 10 deg, smooth, undulating, tight to 1/2" open	H	voids or fossils, cavities to 3/8" diameter with infill of 107.55-110.75' material, laminations, possible bioturbation	
-	R16-NQ 5 ft	68	1	136.65' - Fracture, 30 deg, smooth, undulating, tight 136.8' - Fracture, 80 deg, smooth, undulating, 136.8' - Fracture, 80 deg, smooth, 136.8' - Fracture, 80 deg, smooth, 136.8' - Fracture, 80 deg, 5		122.5-123.5' - very pale orange grading to moderate yellowish brown     with depth, (10YR 8/2 to 10YR 5/4),	- Driller's Remark: All fairly
- 140 -98.7	89%		10	tight 137.45' - Fracture or mechanical break, 60 deg, rough, undulating, associated with —		fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids to 1/16" over 0-15% of surface	hard this run (R16)
-	141 5		1 NR	cavities 138.15' - Fracture or mechanical break, 15 deg, rough, undulating, associated with		increasing in coverage with depth, no visible cavities, trace fossil casts and molds to 3/16"x3/8"	R16: 9 minutes
	141.5			cavities, tight to 1/2" open			



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-19	SHEET	9	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723369.6 N, 458134.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS: 4.2	25 ft b	gs on	5/22/07 START : 5/21/2007 END : 5/2	23/20	LOGGER : C. Wallestad	
≥∩≘	(%)			DISCONTINUITIES	ပ္ခ	LITHOLOGY COMMEI	NTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  SIZE AND DEPTH FLUID LOSS, CORI SMOOTHNESS, C DROPS, TEST RE	NG RATE AND AVING ROD
145 -103.7 -103.7 -108.7 	R17-NG 5 ft 74% 146.5	α 54	0 1 10 2 NR 10 A 3 10 NR		VAS		142.7



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-19	SHEET	10	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723369.6 N, 458134.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

				, , , , , , , , , , , , , , , , , , ,		asiri			ONENTATION: Vertical
WATER	LEVELS: 4.2	25 ft b	gs on t	5/22/07 START : 5/21/2007 E	END : 5/2	3/20	07	LOGGER : C. Wallestad	
				DISCONTINUITIES			1	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		<i>,</i>			SYMBOLIC LOG	Н		<u> </u>
N.E.E	Σ̈́ΑΣ̈́	_	FRACTURES PER FOOT	DESCRIPTION		C		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
필입문	SŤŘ	(%)	58	DEDTH TYPE OBJENTATION POLICHNE	:00	금		MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
Ė₽₹≶	# <u>2</u> 0		C F	DEPTH, TYPE, ORIENTATION, ROUGHNE PLANARITY, INFILLING MATERIAL AND	:33, )	₩ I		WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
		a Q	SP H	THICKNESS, SURFACE STAINING, AND TIGHT		ž		CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ЦОШ	0716	L.	шп			0)	ᆫ		
								139.9-140.95' - yellowish gray, (5Y	
_					-		H	7/2), fine grained, moderate HCl	_
_					_		L	reaction, medium strong (R3), trace	_
								voids to 1/8", no visible cavities,	
-					- 1		r	trace fossil casts to 3/16"x3/8"	_
_					_		L	No Recovery 140.95-141.5'	_
								Limestone	
_					٦		Г	141.5-143.85' - pale yellowish brown,	-
_					_		F	(10YR 6/2), fine to medium grained, moderate HCl reaction, medium	_
								strong (R3), voids to 1/16" over	
]					7			0-20% of rock, one cavity 1-9/16" in	
-					-		F	diameter at 142.8' with medium to	-
							L	coarse grained infill, trace fossil	
1 1					7		Γ	casts to 1"x3/16", banding of fine to	1
-							H	medium grained rock throughout	-
I _					J		L	143.85-145.2' - moderate yellowish	
]					7		1	brown, (10YR 5/4), medium grained,	1
-					Ⅎ		H	moderate HCl reaction, weak (R2),	-
_							L	voids to 1/8" over 30-40% of rock,	_
								trace fossil casts to 3/16"x3/8", no	
_							r	visible cavities	-
_					4		L	No Recovery 145.2-146.5'	_
								Limestone	
_					- 1		r	146.5-147.5' - Same as	1
_					_			143.85-145.2'	
								147.5-150.5' - Same as	
_					1		Г	141.5-143.85' except trace fossil	1
-							F	casts to 3/16" diameter	-
							L	No Recovery 150.5-151.5'	
					7		Γ	Bottom of Boring at 151.5 ft bgs on	1
-					-		H	5/23/2007	-
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-20	SHEET	1	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723468.6 N, 458221.5 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 0 ft bgs	on 5/30/0	07 S	START : 5/30/2007 END : 6/3/2007 LOGGEF	R : J.	Burkard		
				STANDARD	SOIL DESCRIPTION	U	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLIC LOG	DEDTIL OF GLOBIC DRIVING DATE		
ACE VIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	S Lic	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND		
LEV H			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	X WE	INSTRUMENTATION		
<u>40.4</u>	0.0			(14)	No Recovery 0.0-2.0'	0)	13:45 Start drilling		
-				1	-				
-		0.0	SS-1	(1/24")	-	1	Surface consists of grassy wetland material that is 100% saturated.		
-	2.0				-	1	that is 100% saturated.		
-	2.0						1		
-					-	1	1		
					_				
							]		
_					_		_		
5	5.0								
35.4				3-4-6	<b>Silty Sand (SM)</b> 5.0-6.1' - light olive gray, (5Y 5/2), wet, loose, 14% low		Lean clay at bottom of split spoon sample		
-		1.1	SS-2	(10)	plastic fines, very fine to fine silica sand	Ш	-		
-	6.5				-	ł	-		
-					-	1	-		
-					-		-		
-					-	1	-		
-					-		-		
-					-	1	-		
10	10.0				-	1	-		
30.4	10.0				Silty Sand (SM)	Ш	_		
-		0.8	SS-3	0-0-1 (1)	10.0-10.75' - light olive gray, (5Y 5/2), wet, very loose, ↑ 14% low plastic fines, organics in last 1" of sample,		1		
_	11.5			(1)	very fine to fine silica sand	1	_		
_					-		1		
_					_		_		
_					-		_		
-					-	1	_		
-					-	-			
15 <u> </u>	15.0				Silt (ML)	<b>.</b>			
- 20.7		1.1	SS-4	5-6-5	15.0-16.1' - grayish yellow, (5Y 8/4), wet, soft, nonplastic, rapid dilatancy, moderate to strong HCl	<b>-</b>	-		
-		1.1	33-4	(11)	nonplastic, rapid dilatancy, moderate to strong HCl ─ reaction, all carbonate	Ш	-		
-	16.5					1	-		
-					-	1	-		
-					<del>-</del>	1			
-					-	1	1		
-					-	1	]		
_					-	1	]		
20						L			
						1			



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	B-20	CHEET	2 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723468.6 N, 458221.5 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 0 ft bgs	on 5/30/0	)7 5	START : 5/30/2007 END : 6/3/2007 LOGGE	ER:	J. I	Burkard
				STANDARD	SOIL DESCRIPTION	╝.	G	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE ATIC		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND
SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTATION
20.4	20.0				Silt (ML)	$\dagger$	П	
_		1.1	SS-5	5-6-13 (19)	20.0-21.1' - Same as 15.0-16.1' except very stiff	1		-
	21.5			(10)		7	ш	_
						]		_
_						1		_
-						4		-
-						4		-
_						+		-
	25.0					+		-
25 <u> </u>	25.0				Silt (ML)	$\dagger$	П	<del></del>
-		1.2	SS-6	14-15-10 (25)	25.0-26.2' - dusky yellow, (5Y 6/4), some mottling, wet, very stiff, nonplastic, rapid dilatancy, moderate to	1		-
_	26.5			(23)	strong HCl reaction, all carbonate	4	Ш	-
						1		
_						1		_
_						4		<u>-</u>
-						4		-
-						+		-
-						+		-
30 <u> </u>	30.0				Silt With Sand (ML)	+	П	<del></del>
-		1.4	SS-7	3-2-10 (12)	30.0-31.4' - dusky yellow, (5Y 6/4), wet, stiff, nonplastic, rapid dilatancy, moderate HCl reaction,	1		-
-	31.5			(12)	25% fine to coarse sand-sized, 2" organic lens at top of sample, all carbonate	$\mathbb{1}$		_
					or sample, all carbonate	]		
_						1		_
-						4		-
-						+		-
-						+		-
25	25.0					+		-
35 5.4	35.0	0.8	SS-8	15-50/3	Silt With Sand (ML)		П	_
1 -	35.8	0.0	33-0	(65/9")	35.0-35.75' - yeÌlowish gray, (5Y 7/2), moist, hard, ∖ nonplastic, rapid dilatancy, mild to moderate HCl	#	Щ	-
					reaction, 20-25% fine to medium sand-sized, all carbonate	$^{\prime}$		
-					Carbonate	]		
1 -						1		_
-						-		-
-						+		-
-						+		-
40						+		-
40_						$\dagger$		
1								



PROJECT NUMBER:

338884.FL

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SHEET 3 OF 9

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723468.6 N, 458221.5 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 0 ft bgs	on 5/30/0	07 8	START : 5/30/2007 END : 6/3/2007 LOGGE	ER:	: J. Burkard
				STANDARD	SOIL DESCRIPTION	J	COMMENTS σ
A P (±)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			
ACE VIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
<u>о</u> мш 0.4	40.0			(N)	Silt With Sand (ML)	╁	
-	.0.0	1.5	SS-9	20-18-22	40.0-41.5' - yellowish gray, (5Y 7/2), moist, hard, low plasticity, rapid dilatancy, moderate to strong HCl	$\exists$	
-	44.5	1.5	00-3	(40)	reaction, 15-20% fine to coarse sand-sized, all	$\parallel$	
-	41.5				carbonate	┲	<del>                                     </del>
-						1	
-						1	
-						1	
-						1	
_						1	
45	45.0					1	
-4.6	45.6	0.6	SS-10	41-50/1 (100")	Silt With Sand (ML) 45.0-45.6' - dusky yellow, (5Y 6/4), moist, hard, low		
_				(100)	\ plasticity, rapid dilatancy, moderate to strong HCl	Д,	
_					\reaction, 20\% fine to coarse sand-sized, one 1/8" \limestone lens, thin organic layer, all carbonate	1	
_						4	
_						4	
-						+	
-						+	
-						+	
						+	
50 -9.6	50.0				Sandy Silt (ML)	+	<del>,,,,</del>
-		0.9	SS-11	24-33-50/4.5 (83/10.5)	50.0-51.4' - moderate yellowish brown, (10YR 5/4), moist, hard, low plasticity, rapid dilatancy, moderate to	1	
-	51.4			(63/10.5)	strong HCl reaction, 25-30% fine to coarse	1	
-					sand-sized, trace organics, all carbonate	Ŧ	
-						1	
						]	
						]	
_							
-						1	
55	55.0 55.3	0.0	00.40	50/0	Cité Miste Court (MIL)	4	
-14.0	55.5	U.3	SS-12	50/3 (50/3")	Silt With Sand (ML)  55.0-55.3' - moderate yellowish brown, (10YR 5/4),	卍	<b>''' </b>
-					wet, hard, low plasticity, rapid dilatancy, moderate to strong HCl reaction, 20% fine to coarse sand-sized,	4	
-					trace organics, all carbonate	+	End drilling for the day 05/30/07
-						+	3 2
-						+	
-						+	
-						1	
-						1	
60						1	
						1	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-20	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723468.6 N, 458221.5 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 0 ft bgs	on 5/30/0	)7 5	START : 5/30/2007 END : 6/3/2007 LOGGE	R:	J. Burkard
				STANDARD	SOIL DESCRIPTION	Ţ	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR	3	DRILLING FLUID LOSS, TESTS, AND
DEPT SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	3	INSTRUMENTATION
-19.6	60.0	0.6	SS-13	32-50/4	Silt With Sand (ML) 60.0-60.6' - Same as 55.0-55.3'		05/31/07 Start drilling at 07:35
	60.8			(82/10")		ľ	<del>'''</del>
_						1	
-						-	
-						┨	
-						1	
-						1	
						]	
65	65.0 65.2	0.0	00.44	50/0	No December 05 0 05 0	╀	Dellada Daviada Dadi ak 04 5
-24. <del>6</del>		0.0	SS-14)	50/2 (50/2")	No Recovery 65.0-65.2'	Ŧ	Driller's Remark: Rock at 64.5'
-						┨	
-						1	
-						1	
						1	
_						1	
_						1	
						┨	
70 <u> </u>	70.0				Silty Gravel (GM)	-	T
-		1.2	SS-15	55-25-12 (37)	70.0-71.2' - dusky yellow, (5Y 6/4), moist to wet, dense, mild to moderate HCl reaction, fine to coarse	╁	
				(07)	sand-sized, 31% low plastic fines, 40% fine to coarse gravel-sized limestone, all carbonate	1	<u></u>
_					Begin Rock Coring at 71.5 ft bgs	1	
_					See the next sheet for the rock core log	┨	
-						┨	
-						1	
-						1	
75					_	1	_
-34.6						1	
-						-	
-						-	
-						1	
-						1	
						1	
						1	
-						-	
80						╀	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-20	SHEET	5	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723468.6 N, 458221.5 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

WATER	LEVELS: 0 ff	bgs o	on 5/30	0/07 START : 5/30/2007 END : 6/	3/200	7 LOGGER : J. Burkard	
> 0 ::	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THE CONTROL OF STANDARD MATERIAL AND T	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-	71.5 R1A-NQ 1.5 ft 88% 73.0	88	0 NR	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S - III	CHARACTERISTICS  Silt (ML) 71.5-72.3' - yellowish gray, (5Y 7/2), moist, soft, loose, moderate HCI reaction No Recovery 72.3-75.2'	13:45 Start drilling on 05/31/07 - Driller's Remark: Broke drill rod (outer) 1.5' of core sample in outer rod - R1A: 11 minutes
75_ -34.6	R1B-NQ 3.5 ft 37%	37	NR			Limestone 75.2-76.5' - pale olive, (10Y 6/2),	10:55 Start drilling on 06/01/07 –
-	76.5		0	75.6, 76.1' - Mechanical break (2), <75 deg		medium grained, moderate HCl reaction, medium strong to strong (R3 to R4), 1/16-1/8" voids over	- 11:30 Driller's Remark:
			0	76.9, 77.2, 77.6, 77.9, 78.0, 78.2' - Mechanical break (6), 50-90 deg 77.5' - Joint, >5 deg, rough, undulating		<ul> <li>25-40% of surface, fossil casts and molds</li> <li>76.5-79.3' - light olive gray, (5Y 5/2),</li> </ul>	Drillers run out of water -
-	R2-NQ 5 ft	16	0	78.5-78.9' - Fracture zone, 50-90 deg		medium grained, moderate to strong HCl reaction, medium strong (R3), 1/16" voids over 20-40% of surface, fossil casts and molds	- - -
80_ -39.6	56%		NR	- - -		- No Recovery 79.3-81.5' 	-  R2: 8 minutes
-	04.5			-	仜	-	=
-	81.5		>10	81.5-82.2' - Fracture zone, 60-70 deg, rough, non-planar, fragments from 3/4-3"		Limestone  - 81.5-85.6' - light olive gray (5Y 5/2) from 81.5-82.7', dusky yellow (5Y	- -
-	] 		0	82.7, 83.2' - Mechanical break (2)		6/4) from 82.7-85.2', light olive gray - (5Y 5/2) from 85.2-85.6', mild HCl reaction, medium strong (R3), small (1/16-1/8") voids over 30-40% of	- - -
-	R3-NQ 5 ft 82%	50	0	83.9, 84.9' - Mechanical break (2)		<ul> <li>surface, several large surface cavities up to 1/2" in diameter, organic stains and thin lenses</li> </ul>	- -
85 <u>-</u> -44.6			0	85.4' - Mechanical break		throughout section - No Recovery 85.6-86.5'	R3: 4 minutes
-	86.5		NR 0			Limestone - 86.5-91.1' - light olive gray, (5Y 6/1),	_ _ _
-			0			medium to fine grained, moderate to strong HCl reaction, medium strong - (R3), small (1/16-1/8") voids over 25-30% of surface, highly	SC-1 collected at 88.0-
-	R4-NQ 5 ft 92%	78	0		Ħ	25-30% of surface, nignly fossiliferous with molds and casts   1/4-3/4" comprising up to 30% of rock	89.0' -
90 <u>-</u> -49.6			<10	89.9-90.3' - Fracture zone, 1/2"-1-1/2" — fragments, highly fossiliferous, large cavities and molds			R4: 6 minutes
	91.5		NR	90.9' - Mechanical break	H	No Recovery 91.1-91.5'	_



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-20	SHEET	6	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723468.6 N, 458221.5 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 0 f	t bgs o	on 5/30	0/07 START : 5/30/2007 END : 6/	3/2007	LOGGER : J. Burkard	
≥D≎	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
ELO N (#	Ä, AND 3Y (%	_	₹ES	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_			0	92.0-92.7' - Fracture zone, fragments 1/2-1"	Ħ	<b>Limestone</b> - 91.5-92.8' - Same as 76.5-79.3'	-
-			0	in diameter, few >1-1/2", highly fossiliferous 30-40% cavities/fossil molds	Ħ	- - 92.8-93.9' - light olive gray, (5Y 5/2),	SC-2 collected at 92.8-
-	R5-NQ 5 ft	40	2	93.6' - Joint, >5 deg, smooth, undulating 93.8' - Joint, 10-20 deg, rough, undulating,		fine grained, moderate to strong HCI reaction, medium strong to strong (R3 to R4), trace voids on surface	93.8'
95	68%		0	calcareous silt 94.6-94.7' - Mechanical break or fracture	H	_ \Calcareous Silt (ML) 93.9-94.0'	-
-54. <del>6</del>			NR	zone		<ul><li>Limestone</li><li>94.0-94.9' - dusky yellow, (5Y 6/4), medium grained, strong HCl</li></ul>	R5: 5 minutes
-	96.5				Ħ	reaction, medium strong to strong (R3 to R4) No Recovery 94.9-96.5'	-
-			0	96.7-98.2' - Fracture zone, many large fragments 3-4" with numerous smaller fragments 1/2-1" in diameter, larger	Ħ	Limestone 96.5-98.7' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), medium	-
-	100		0 fi	fragments exhibit high angle (60-70 deg) fracture surfaces, many in conjugate pairs, rough and semi-planar		grained, moderate to strong HCI reaction, weak to medium strong (R2	-
-		0			$\pm$	to R3), 1/16-1/8" voids over 25-40% of surface, cavities/fossil molds 1/8-3/4" in diameter over 10-20% of	-
100 -59.6			NR	_		surface, 5-10% cavities are infilled  — with secondary material, fossil molds and casts	_
-	404 =					No Recovery 98.7-101.5'	R6: 3 minutes
-	101.5			101.6' - Fracture, 45 deg, rough, undulating	士	_ Limestone	-
_			1	to non-planar 101.9' - Fracture, 60 deg, rough, undulating		- 101.5-102.3' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very strong (R5), trace	- -
-				to semi-planar, intersecting 102.0' - Parting surface, horizontal	Ħ	- surface voids No Recovery 102.3-108.0'	-
-	R7-NQ 5 ft 16%	0	NR		Ħ	-	-
105_			1414		$\parallel$	<del>-</del>	
-64. <del>6</del>					Ħ	-	R7: 4 minutes
-	106.5				囯	-	Driller's Remark: Driller
-			NR		甘	-	noted a void space for 106.5'
-				109 0' Fracture or mechanical break	$\blacksquare$	_ Limestone	-
-	R8-NQ		0	108.0' - Fracture or mechanical break, horizontal, rough, undulating	団	<ul> <li>108.0-109.2' - dusky yellow, (5Y 6/4),</li> <li>medium grained, strong HCl</li> </ul>	-
-	5 ft 24%	10	0	108.5-109.2' - Fracture zone, fragments 1/2-1" with single fragment 3", irregular	Ħ	reaction, weak to medium strong (R2 to R3), 1/16-1/8" voids over 20-30%	-
110 -69.6				fracture surface, 3" fragment exhibits near vertical fracture surfaces	$\forall$	of surface No Recovery 109.2-111.5'	
-			NR		Ħ	-	R8: 2 minutes
-	111.5						



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723468.6 N, 458221.5 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

WATER	LEVELS: 0 f	t bgs o	on 5/30	0/07 START : 5/30/2007 END : 6/	3/200	LOGGER : J. Burkard	
≥O≎	. (%			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
ELO R ANI	AND 3₹ (%	_	₹ES	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	RQ	FRA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
_			<10	111.5-112.2' - Fracture zone, 3/4"-1-1/2" fragments	$\blacksquare$	Limestone - 111.5-112.8' - dusky yellow, (5Y 6/4),	
_				112.2, 112.4' - Fractures or mechanical break	ᆣ	moderate HCl reaction, very weak (R1), 1/16-1/8" voids over 25% of	
_			1	(2), 10-15 deg, rough, undulating to semi-planar	世	- surface	
_	R9-NQ			112.6' - Fracture, horizontal, rough, planar, open	H	112.8-114.6' - grayish yellow, (5Y 8/4), medium grained, extremely	
	5 ft 62%	25	0	112.65' - Mechanical break, non-planar, irregular	Ħ	<ul> <li>strong HCl reaction, very weak (R1),</li> <li>1/16-1/8" voids over 20% of surface,</li> </ul>	
115 <u> </u>				112.9, 113.1, 113.2, 113.7, 114.4' - Fractures (5), horizontal, rough, undulating —	片	cavities/fossil molds and casts — 1/8-1/2" in diameter over 5-10% of	_
-74.0			NR		厈	surface No Recovery 114.6-116.5'	R9: 2 minutes
_	116.5				Ħ	-	
_	110.5				Ē	Limestone	SC-3 collected at 116.5-
			0		$\perp$	- 116.5-118.1' - Same as 112.8-114.6' -	117.5'
_			0	117.5, 118.1' - Fractures (2), horizontal, rough, undulating, open	士	-	
_	R10-NQ			118.4' - Fracture, 60 deg, non-planar	士	118.1-120.0' - pale greenish yellow, (10Y 8/2), medium to fine grained,	
-	5 ft 96%	60	0	118.5' - Fracture, 5 deg, smooth, planar 118.9' - Fracture, 15 deg, rough, undulating	世	<ul> <li>extremely strong HCl reaction, very weak (R1)</li> </ul>	
120			<10	119.0' - Fracture, 15 deg, rough, undulating 119.1' - Fracture, vertical, irregular, tight		<u> </u>	_
-79. <del>6</del> -			-10	119.2' - Fracture, 20 deg, rough, undulating 119.7' - Fracture or mechanical break,	Т	120.0-121.3' - Same as 118.1-120.0' - except extremely weak to weak (R0	D40: 4 minute
_			4	horizontal, rough, undulating 120.0-121.3' - Fracture zone, very soft,		to R2)	R10: 1 minute
-	121.5		NR.	friable, 1-4" with rough, undulating, irregular fracture surfaces		<ul> <li>No Recovery 121.3-121.5'</li> <li>Limestone</li> </ul>	
_			0	iracture surfaces	$\perp$	121.5-122.5' - dusky yellow, (5Y 6/4), medium to fine grained, moderate to	
			>10	122.5-126.4' - Fracture zone, fragments 1-4", rough, undulating, irregular fracture surfaces,	H	strong HCl reaction, weak to medium	
_	R11-NQ			vertical fractures intersected by irregular, non-planar, low angle fracture, non-planar	片	strong (R2 to R3), fossil casts and molds 1/2-1" in diameter over	
_	5 ft	43	0	non-planar, low angle fracture, non-planar	片	10-15% of surface, trace voids 122.5-123.5' - dusky yellow, (5Y 6/4),	-
- 125	98%				Ħ	<ul> <li>medium grained, strong HCl reaction, very weak (R1), trace voids</li> </ul>	-
-84.6			3	_	Ħ	123.5-124.0' - Same as 121.5-122.5' except no fossil molds and casts	
			5		Ħ	124.0-126.4' - dusky yellow, (5Y 6/4), medium grained, strong HCl	R11: 4 minutes
-	126.5		NR)	400.051.5	$\equiv$	reaction, weak (R2), fossil casts and molds up to 1/2" in diameter over	
_			0	126.65' - Fracture, horizontal, rough 127.1' - Fracture, 15 deg, semi-planar to	$\Box$	5-10% of surface, 1/16-1/8" voids	-
-			<10	undulating 127.1-128.0' - Fracture zone, fragments	世	_ over 15-25% of surface No Recovery 126.4-126.5'	
				3/4-2", bedding plane	$\perp$	Limestone 126.5-128.0' - dusky yellow, (5Y 6/4),	
-	R12-NQ 5 ft	8			口	medium to fine grained, strong HCl reaction, extremely weak to very	
120	30%		NR		厂	weak (R0 to R1), fossil casts and molds, 1/16-1/8" voids over 50-70%	
130 <u> </u>			1411	_	口	— of surface No Recovery 128.0-131.5'	-
-					厂		R12: 4 minutes
	131.5				E		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-20	SHEET	8	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723468.6 N, 458221.5 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

WATER	LEVELS: 0 f	bgs c	on 5/3	0/07 START : 5/30/2007 END : 6/3	3/200	7 LOGGER : J. Burkard	
≥0.0	(9)			DISCONTINUITIES	Ö	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
DEPTI SURF, ELEV	CORE LENG RECO	RQD	FRAC PER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			0	131.5-132.0' - Disaggregated material 132.0' - Bedding plane, horizontal, smooth,	Ш	Silt (ML) 131.5-132.0' - yellowish gray, (5Y 7/2), strong HCl reaction, with	Finish drilling for the day at 17:30 on 06/01/07 – Start drilling at 07:55 on
-			0	planar 132.3, 132.6, 132.9' - Fractures or mechanical break (3), rough, undulating to	Ħ	\limestone fragments Limestone	06/03/07
-	R13-NQ 5 ft	22	<10	non-planar 133.5' - Bedding plane, 10 deg, smooth, planar	Ħ	_ 132.0-133.7' - dusky yellow, (5Y 6/4), medium to fine grained, strong HCI reaction, weak to medium strong (R2	- -
135_ -94.6	60%			133.6-134.4' - Fracture zone, fragments range from 1/2-2"	Ħ	to R3) 133.7-134.5' - dusky yellow, (5Y 6/4), — medium grained, moderate HCl	- -
-94.0			NR	-	reaction, extremely weak (R0), 1/16-1/8" voids over 50% of surface No Recovery 134.5-136.5'	R13: 3 minutes	
_	136.5			-	⊬	· -	
-			0	136.5, 136.6, 136.9, 137.1' - Fractures (4), 0-15 deg, rough, undulating to semi-planar 137.2' - fine grained limestone, no voids		Limestone - 136.5-137.2' - Same as 133.7-134.5' except very weak (R1)	-
_			0	137.3' - Fracture, 45 deg, rough to stepped, non-planar 137.5, 138.4, 138.7, 139.0' - Fractures or	Ħ	137.2-139.0' - light olive gray, (5Y - 6/1), fine grained, moderate to strong HCl reaction, strong to very strong	-
_	R14-NG 5 ft 86%	40	0	mechanical break (4), 0-10 deg, rough, undulating to semi-planar 139.0-140.8' - Fractures, rough, undulating to	Ħ	(R4 to R5), trace 1/16" voids across surface, cavities/fossil molds up to 3/4" in diameter over 5% of rock	-
140 -99.6			<10	semi-planar, spaced 1-2" apart with zones of rock fragments ranging from 3/4"-1-1/2", dark —		concentrated in 1-2" zones (up to 30%), numerous fossil casts and molds	- -
-			NR	surfaces (more prevalent with depth)  1: 7.	139.0-140.8' - yellowish gray, (5Y – 7/2), medium to fine grained, strong HCl reaction, weak to medium strong	R14: 7 minutes	
-	141.5		1	- 141.7' - Fracture, horizontal, rough, undulating	Ħ	(R2 to R3), dark brown/black staining on fracture, 1/16-1/8" voids over 10%	- -
-			0	142.2' - Bedding plane, 5 deg, smooth, planar	Ħ	of surface No Recovery 140.8-141.5' Limestone	SC-4 collected at 142.2- 143.1'
-	R15-NQ 5 ft	50	2	143.7' - voids		141.5-141.7' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, strong (R4), trace cavities	-
145	70%		1	143.7, 143.8, 143.9' - Fractures (3), horizontal, rough, undulating 144.2' - Mechanical break, rough to stepped,	Ħ	on surface - 141.7-141.8' - Same as 141.5-141.7' - except voids	_
-104.6 - -			NR	undulating to non-planar 144.5, 144.7, 145.0' - Fractures or mechanical break (3), horizontal, rough,	F	141.8-143.6' - Same as 141.5-141.7' 143.6-145.0' - moderate yellowish brown, (10YR 5/4), medium grained,	R15: 7 minutes
-	146.5		0	undulating 145.1' - Bedding plane, horizontal, smooth, planar		mild HCl reaction, very weak to weak (R1 to R2), 1/16" voids over up to 50% of surface, cavities/fossil molds	_
_			1	146.6, 146.7, 146.75, 147.0, 147.2, 147.3, 147.6' - Fractures (7), 0-5 deg, rough, undulating, bedding plane partings	Ħ	up to 1/2" in diameter over <5% of rock <b>No Recovery 145.0-146.5</b> '	11:30 Driller's Remark: Drillers run out of water, go –
-	R16-NQ			-	F	Limestone 146.5-147.3' - moderate yellowish brown, (10YR 5/4), medium grained,	to refill water tank 13:30 Driller's Remark:
150	5 ft 100%	67	0	-	Ħ	mild to strong HCl reaction, very weak (R1), finely laminated, wavy bedding planes, 1/16" voids over	Refill drill with water – SC-5 collected at 147.9- 148.8'
-109.6 _			0		H	10-20% of surface, one 1" surface cavity	R16: 4 minutes
_	151.5		0	150.8' - voids	E	_	-



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	B-20	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723468.6 N, 458221.5 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

WATER	LEVELS: 0 f	t bgs c	on 5/30	0/07 START : 5/30/2007	END : 6/3	0 : 6/3/2007 LOGGER : J. Burkard				
				DISCONTINUITIES		ō	LITHOLOGY	COMMENTS		
ELOV : ANE	AND ≪≪%		ES T	DESCRIPTION		ССО	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
TH BE	E RU	Q D (%)	FOOT	DEPTH, TYPE, ORIENTATION, ROUG	HNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQ[	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL THICKNESS, SURFACE STAINING, AND	. AND TIGHTNESS	SYMBOLIC LOG	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.		
		-		\ 151.0, 151.2, 151.25' - Fractures (3)	, <5 deg, /		147.3-150.8' - light olive gray, (5Y	09:00 Finish drilling on		
_				rough, undulating, bedding plane par	rtings / -		- 5/2), fine grained, moderate to strong HCl reaction, strong (R4), trace fossil	06/03/07 -		
_					_		molds and casts 1/2" on surface	11:30 Driller's Remark:		
-					_		- 150.8-151.5' - moderate yellowish brown, (10YR 5/4), medium grained,	Drillers run out of water, go - to refill water tank		
					_		mild HCl reaction, very weak to weak (R1 to R2), 1/8-3/16" voids over 50%	13:30 Driller's Remark:  Refill with water		
_					_		of surface			
_							Bottom of Boring at 151.5 ft bgs on 6/3/2007	_		
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PROJECT NUMBER:	BORING NUMBER:					
338884 FI	B-21	SHEET	1	OF	R	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723224.9 N, 458119.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 4-7/8" drag bit and 4-7/8" tri-cone bit

ORIENTATION: Vertical

WATER	LEVELS	: 3.5 ft b	gs on 6/0:	3/07	START : 5/30/2007 END : 6/4/2007 LOGGER : C. Dellaria, P. De Sa'rego
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	AL (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
ACE \TIOI		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR,  MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EPTI URF.			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
41.8	0.0			(14)	<b>Top Soil</b> Split spoon sampling begins at 15:13
-		1.5	SS-1	0-2-3	0.0-0.5' - brownish black, (5YR 2/1), moist, organic  Driller's Remark: Spade bit used to 15.0'
-	1.5			(5)	Poorly Graded Sand (SP)
-					0.5-1.5' - light gray, (N7), moist, loose, very fine to fine grained, 5% fines, nonplastic, organics decreasing
					with depth, sand is silica
_					
_					<b>.</b>
-					
-					
5 36.8	5.0				Silty Sand (SM)
-		0.7	SS-2	1-2-1	5.0-5.7' - moderate brown to pale yellowish brown, -
-	6.5	0.7	00-2	(3)	(5YR 4/4 to 10YR 6/2), moist, very loose, very fine to fine grained, 20% fines, low plasticity, sand is silica
-	0.5				- 1
-					† <b> </b>
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_					
10 <u> </u>	10.0				Limenton Community
31.0			00.0	3-16-10	Limestone Fragments  \[ \text{10.0-10.3' - pale yellowish brown, (10YR 6/2), strong } \]
-		0.8	SS-3	(26)	HCI reaction, angular limestone rock fragments to //-
-	11.5				Silt (ML)
-					10.3-10.8' - grayish orange, (10YR 7/4), wet, very stiff,   _   nonplastic, very rapid dilatancy, moderate HCl
-					reaction, limestone fragments in shoe, all carbonate derived
-					Driller's Remark: Switch to 4-7/8" roller cone
-					- bit
					] [
15	15.0				<u>                                     </u>
26.8	15.8	0.8	SS-4	30-50/3 (80/9")	Limestone Fragments  \[ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-	13.0			(00/0 )	\to 1/2" \
-					Silt With Sand (ML)   15.3-15.75' - very pale orange, (10YR 8/2), moist,   -
-					hard, nonplastic, very rapid dilatancy, moderate to strong HCl reaction, 20% fine grained sand, all
-					carbonate derived
-					
-					
-					
20					1 1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-21	SHEET	2	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723224.9 N, 458119.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

		OD AND	/		NA OFFICE AND A CONTRACTOR . OTHER CONTRACTOR . AND A CONTRACTOR . AND	ON 1/ /' 1
					· · · · · · · · · · · · · · · · · · ·	ON : Vertical
WATER	LEVELS	: 3.5 ft bo	s on 6/03	3/07	START : 5/30/2007 END : 6/4/2007 LOGGER : C. Dellaria, P. De Sa'rego	
<b>≥</b> □€				STANDARD PENETRATION	SOIL DESCRIPTION COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	` '	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLII DRILLING FLUID LOSS, TES	NG BATE
H BI ATIC		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TES	STS, AND
EPT SURF ILEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	N
21.8	20.0			(14)	Silty Sand With Limestone Fragments (SM)           End drilling on 5/30/07	
-		1.3	SS-5	36-30-8	20.0-21.25' - very pale orange, (10YR 8/2), moist,	45
-		1.5	33-3	(38)	dense, fine to coarse grained, 37% fines, low plasticity, moderate HCl reaction, 30% fine	-
-	21.5				\ gravel-sized limestone fragments, all carbonate   /	-
-					\derived \_	-
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_						_
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25 <u> </u>	25.0				Silt With Sand (ML)  Driller's Remark: Harder mater	rial at 3/1.5'
10.0				15-22-18	25.0-25.9' - grayish orange, (10YR 7/4), moist, hard, -	nai ai 34.5 , -
_		0.9	SS-6	(40)	trace% gravel, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 15% fine to medium grained	-
_	26.5				\sand, trace fine grained gravel, all carbonate derived / -	-
_						_
_						_
_						_
_						_
_						_
_						_
30	30.0					
11.8				10-19-20	Silt With Sand (ML) 30.0-31.0' - Same as 25.0-25.9'	_
		1.0	SS-7	(39)		_
_	31.5					_
_					<u> </u>	_
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35	3 <u>5</u> .0 35.2					
6.8	35.2	0.2	SS-8	50/2 (50/2")	Limestone Fragments  35.0-35.2' - pale yellowish brown, (10YR 6/2),  Driller's Remark: Hard material Casing set to 35.0'	.l
				(30/2)	moderate to strong HCl reaction, angular fragments to / _	_
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-21	SHEET	3	OF 8	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723224.9 N, 458119.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 4-7/8" drag bit and 4-7/8" tri-cone bit

ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 6/03/07									
300				STANDARD	SOIL DESCRIPTION	ß	COMMENTS		
AND AND (#)	SAMPLE INTERVAL (ft)			PENETRATION TEST RESULTS	SOIL NAME LISCS CROLIB SYMBOL COL	LOP		DEPTH OF CASING, DRILLING RATE,	
H BE	RECOVERY (ft)			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OF		BOLI	DRILLING FLUID LOSS, TESTS, AND		
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERA	ALOGY	SYMBOLIC LOG	INSTRUMENTATION	
1.8	40.0			. ,	Silt (ML)		Ш		
-		1.4	SS-9	21-21-21 (42)	40.0-41.4' - pale yellowish brown, (10YR 6/2) hard, nonplastic, rapid dilatancy, moderate to	strong	111	_	
	41.5			( := /	HCI reaction, 10-15% fine to medium grained carbonate derived	I sand, all	Ш	1	
-					Carbonate delived			_	
-						-		-	
-	-					-	ł	-	
-	-					-	ł	-	
-						-		-	
45	45.0					-	ł	-	
-3.2	45.0	0.8	SS-10	61-50/3	Silty Sand With Limestone Fragments (SM)			End drilling on 5/31/07	
-	45.8	0.0	33-10	(111/9")	45.0-45.8' - pale yellowish brown, (10YR 6/2) very dense, fine to coarse grained, 35% fines	, moist,	Ш	Begin drilling on 6/1/07 at 07:30	
-					plasticity, moderate HCl reaction, 15% fine to grained gravel, all carbonate derived	coarse	1	-	
					gramed graver, all carbonate derived				
_						-	1	_	
_						-		_	
-	-					-		-	
-						-	ł	-	
-						-	ł	-	
50 -8.2	50.0				Sandy Silt With Limestone Fragments (ML)		Ш		
-	-	1.2	SS-11	1-2-50/4 (52/10")	50.0-51.2' - pale yellowish brown, (10YR 6/2) hard, nonplastic to low plasticity, rapid dilatar		╢	-	
-	51.3			(02/10/)	lacksquare to moderate HCl reaction, 30% fine to coarse	grained /	Ш	<u> </u>	
					\sand, 35% fine grained gravel, all carbonate	aerivea / -			
						_		_	
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-13.2	55.0				Sandy Silt With Limestone Fragments (ML)		Ш		
-		1.4	SS-12	19-31-39	55.0-56.4' - pale yellowish brown, (10YR 6/2) hard, low plasticity, rapid dilatancy, 35% fine	, moist, -	╢	-	
-	56.5			(70)	grained sand, laminated black organic layers	at	Ш	<u> </u>	
-	23.5				55.3-55.5', fine to coarse gravel-sized limesto fragments in last 0.25', mild to moderate HCl	one reaction /	1	-	
	]				\in all materials (except organics)			]	
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PROJECT NUMBER:	BORING NUMBER:	
338884.FL	B-21	SHEET 4 OF 8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723224.9 N, 458119.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 4-7/8" drag bit and 4-7/8" tri-cone bit

WATER LEVELS: 3.5 ft bgs on 6/03/07 START: 5/30/2007 END: 6/4/2007 LOGGER: C. Dellaria, P. De Sa'rego									
CTANDADD					SOIL DESCRIPTION COMM	ENTS			
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE INTERVAL (ft)			PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING DRILLING FLUID LC				
BEL SE A	RECOVERY (ft)			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,				
PTH 3FAC		1.20012	#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR OF DRILLING FLUID LC CONSISTENCY, SOIL STRUCTURE, MINERALOGY OF INSTRUME				
SUF			#1111	(N)					
-18.2	60.0			10.05.00	Silty Sand (SM) 60.0-61.2' - pale yellowish brown, (10YR 6/2), moist,  Driller's Remark: Hardi	er material at 62.0-			
		1.2	SS-13	19-35-28 (63)	hard, medium plasticity, rapid dilatancy, moderate to				
	61.5			(55)	mild HCl reaction, limestone from 60.0-60.7' and 61.1-61.2', elastic silt lens from 60.7-61.1' (dark				
					yellowish brown [10YR 4/2]), all carbonate derived				
					]				
					]				
					]				
65	65.0								
-23.2	65.3	0.3	SS-14	50/4 \ (50/4") /	Limestone And Sandy Silt (ML)  65.0-65.3' - moderate yellowish brown, (10YR 5/4),				
_				(30/4)	moderate HCl reaction, 60% of sample is fine to				
l _					\coarse grained limestone gravel, 40% is carbonate \def derived sandy silt similar to previous samples				
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_						_			
_					<u> </u>	_			
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_						_			
_					<u> </u>	_			
70	70.0				0 1 071/441)	_			
-28.2				17-6-9	Sandy Silt (ML)  70.0-70.4' - pale yellowish brown, (10YR 6/2), moist,	-			
_		0.8	SS-15	(15)	hard, low plasticity, rapid dilatancy, moderate HCl	-			
_	71.5				reaction, 25-30% fine to coarse grained sand, all carbonate derived	-			
_					Limestone Fragments	-			
_					70.4-70.8' - pale yellowish brown, (10YR 6/2), mild to moderate HCl reaction, fine to coarse grained angular	-			
_					limestone rock fragments, trace organics	-			
_					- 1	-			
-						-			
-						-			
75 <u> </u>	75				Limestone Fragments And Silty Sand (SM)				
-55.2		4.5	00.40	21-2-3	75.0-76.5' - Same as 70.0-70.8' except limestone -	-			
-		1.5	SS-16	(5)	fragments from coarse sand to coarse gravel mixed with carbonate derived silts and sands  Driller's Remark: 100%	water loss			
-	76.5				Regin Rock Coring at 75.0 ft bas				
-					See the next sheet for the rock core log				
-					-	-			
-					-	-			
-					-	-			
-					-	-			
					-	-			
80					++				



PROJECT NUMBER:

338884.FL

B-21

SHEET 5 OF 9

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723224.9 N, 458119.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, NQ tools, HW casing

DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  -33.2 75.0  R1-NQ 2 ft 0 NR	MMENTS  EPTH OF CASING, CORING RATE AND SS, CAVING ROD T RESULTS, ETC.
DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, CHARACTERISTICS  No Recovery 75.0-77.0'  No Recovery 75.0-77.0'  No Recovery 75.0-77.0'  R1-NQ 2 ft 0% 77.0-77.3' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.55-78.75' - Fracture, vertical, rough, undulating, moderately tight  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SMOOTHNESS CHARACTERISTICS  No Recovery 75.0-77.0'    Limestone	EPTH OF CASING, CORING RATE AND SS, CAVING ROD T RESULTS, ETC.
-33.2 75.0  R1-NQ 2 ft 0%	CORING RATE AND SS, CAVING ROD T RESULTS, ETC.
-33.2 75.0  R1-NQ 2 ft 0%	CORING RATE AND SS, CAVING ROD T RESULTS, ETC.
-33.2 75.0  R1-NQ 2 ft 0%	T RESULTS, ETC.
-33.2 75.0  R1-NQ 2 ft 0%	not recorded
R1: Run time    R1-NQ   2 ft   0	not recorded -
2 ft 0% NR 77.0 NR 77.0-77.3' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.0-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture, vertical, rough, undulating, moderately tight R1: Run time 77.0-78.75' - pale yellowish brown, (10YR 6/2), fine to medium grained, mild HCI reaction, weak (R2), voids (3/16") over 15-20% of rock surface, trace cavities up to 9/16"x3/8" No Recovery 78.75-82.0'	not recorded
77.0  77.0  77.0-77.3' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.75' - Pale yellowish brown, (10YR 6/2), fine to medium grained, mild HCI reaction, weak (R2), voids (3/16") over 15-20% of rock surface, trace cavities up to 9/16"x3/8" No Recovery 78.75-82.0'	not recorded
77.0-77.3' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture, vertical, rough, undulating, moderately tight 78.5-78.75' - Fracture, vertical, rough, undulating, moderately tight 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5"	- - - - -
77.0-77.3' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture, vertical, rough, undulating, moderately tight 78.5-78.75' - Fracture, vertical, rough, undulating, moderately tight 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5" 78.5-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5"	- - - - -
77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5"  78.55-78.75' - Fracture, vertical, rough, undulating, moderately tight  78.55-78.75' - Fracture, vertical, rough, undulating, moderately tight  78.55-78.75' - Fracture, vertical, rough, undulating, moderately tight  78.55-78.75' - Fracture, vertical, rough, undulating, moderately tight  78.55-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5"  78.55-78.75' - Fracture, vertical, rough, undulating, moderately tight  78.55-78.75' - Fracture zone, limestone rock fragments from 3/4"-1.5"  78.55-78.75' - Fracture, vertical, rough, undulating, moderately tight	- - - -
fragments from 3/4"-1.5"  No Recovery 78.75-82.0'  fragments from 3/4"-1.5"  78.55-78.75' - Fracture, vertical, rough, undulating, moderately tight  fragments from 3/4"-1.5"  78.55-78.75' - Fracture, vertical, rough, undulating, moderately tight  No Recovery 78.75-82.0'	_ _ _
R2-NQ String and Strin	-
R2-NQ	-
- 5 ft 35	ŀ
80 35%	
	7
R2: 9 minutes	s
	7
82.0-82.4' - Fracture zone, limestone rock Limestone	+
	4
82.75-82.9' - Fracture zone, limestone rock except moderate yellowish brown, (10YR 5/4), 5-10% partially infilled	4
fragments from 3/4"-2"    0   fragments from 3/4"-2"   (10YR 5/4), 5-10% partially infilled cavities 3/4" x 1-3/16"	
05.1, 05.7, 04.15 - Weditallical bleak (5)	_
R3-NQ	
5 ft   51   2   84.35-84.5' - Fracture, 30 deg, rough, 64%   undulating, open	
43.2 0 84.4-84.45' - Fracture, 30 deg, rough, Driller's Remarks	
undulating, open — No Recovery 65.2-67.0 advanced to a Driller's Remarks	
	nud (not
bentonite qui	
87.0 R3: 18 minute  87-88' - Fracture zone, limestone rock Limestone  Drilling ends	es on 6/01/2007,
(10YR 6/2), fine grained, moderate to rain HCl reaction, medium strong (R3), Drilling begin:	s on 6/03/07
88.0-88.2' - Fracture, 60 deg, rough, HCl reaction, medium strong (R3), Drilling begin: HCl reaction, medium strong (R3), Drilling begin: small voids (1/16"-1/8") over 5-15% at 07:35	3 011 0/03/07
of rock surface increasing with depth. SC-1 collecte	d at 88.0-
R4-NQ	ark <sup>.</sup>
90 58% undulating, open 38.0-89.9 trace cavities up to Circulation lo	
-48.2 89.7' - Fracture, horizontal, rough, undulating, 3/4"x3/8", partially infilled with	
open - recrystalized carbonate, some with black staining, moderate HCI	†
R4: 18 minute	es -
- 88.0-89.9' - voids (1/16"-1/8") over	4
92.0 92.0-93.0' - Fracture zone, limestone rock with depth)	4
>10 fragments from 1/2"-3/4" No Recovery 89.9-92.0'	_
Limestone 92.0-93.0' - pale yellowish brown,	_
93.25' - Fracture, horizontal, rough, (10YR 6/2), fine grained, moderate	_
undulating, open HCI reaction, medium strong (R3),	
R5-NQ 2 94.0' - Fracture, 60 deg, rough, undulating, cavities (1" x 1-3/16") over 25% of rock surface, highly fossiliferous	7
5 ft   15   open	7



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-21	SHEET	6	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723224.9 N, 458119.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING	NETHOD A	ND E	JUIPIV	IENT: CME 75 S/N 252437, mud rotary, NQ tools, HW c	asing		ORIENTATION : Vertical
<u>WATE</u> R	LEVELS : 3.5	ft bg	s on 6/	/03/07 START : 5/30/2007 END : 6/	4/200	7 LOGGER : C. Dellaria, P. De Sa'ı	rego
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		w	DESCRIPTION	SYMBOLIC LOG	DOOK TYPE OOL OD	
N A N	L'A'N	(9	FRACTURES PER FOOT	DESCRIPTION	일	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
H H S E	E E E	(%) Q	Ĭ	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30L	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	N N N N N N N N N N N N N N N N N N N	Ø	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Σ×	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	075	ď	ш а		S		
-53.2				94.1' - Fracture, horizontal, rough, undulating,	ш	93.0-93.2' - pale yellowish brown,	Driller's Remark: No
-			NR	open -	т	<ul> <li>(10YR 6/2), fine grained, medium strong (R3), voids over 0-3% of rock</li> </ul>	circulation –
-						surface, no cavities	R5: 22 minutes
_					Н	- 93.2-94.2' - voids (1/16-1/8") over	- Tto: 22 minutes
_	97.0				П	5-15% of rock surface (increasing	
-				97.0-97.1' - Fracture zone, limestone rock	П	with depth), trace cavities up to	1
-			>10	fragments from 3/4"-1.5"	Н	- 3/4"x3/8", partially infilled with	-
-				97.8-97.95' - Fracture zone, limestone rock	Н	recrystallized carbonate, some with black staining, moderate HCl	-
_			2	fragments from 1/2"-1"		- reaction	_
				98.4-98.5' - Fracture or mechanical break, 30	Н	No Recovery 94.2-97.0'	
-	R6-NQ			deg, rough, stepped 98.75' - Fracture, <10 deg, rough, undulating,	ш	Limestone	
I	5 ft	23		open	口	97.0-99.05' - Same as 88.0-88.9'	-
100_	41%			_	Н	except cavities 1-3/16" x 2" infilled with fine grained material, voids over	_
-58.2						3% of rock surface, medium light	
-			NR		Н	gray (N6) to gravish orange (10YR	Driller's Remark: Cavity at
-				•	Н	7/4) infilling increases with depth	100.5-104.0' -
-					ш	_ from 5% at 97.0' to 40% at 99.05'	R6: 21 minutes
_	102.0			_	Н	No Recovery 99.05-102.0'	_
					Н	No Recovery 102.0-104.0'	
_				•	ш	- Cavity	_
-			NR		Н	=	-
-					H	_	_
I -	R7-NQ		0		Н	Limestone	1
405	5 ft	0		•		- 104.0-104.1' - Same as 88.0-88.9'	_
105_ -63.2	2%			_	ш	except no infilling, voids over 10% of rock surface, no cavities	
- 00.2			NR		Н	- No Recovery 104.1-107.0'	_
			'\'\			,	
					ш		R7: 4 minutes
-				-	ĦП	-	-
_	107.0			407.0.407.01. Frankins		- Umantana	_
_			>10	107.0-107.3' - Fracture zone	Н	Limestone - 107.0-107.3' - pale yellowish brown,	_
			' '	107.6' - Fracture or mechanical break, 45	Ш	(10YR 6/2), fine grained, weak to	
-				deg, rough, undulating, open	$\Box$	medium strong (R2 to R3), voids	1
-			2	107.85' - Fracture or mechanical break,	┰	<ul> <li>over 10% of rock surface, 10%</li> </ul>	-
-				horizontal, rough, undulating, 2 inch open 108.0' - Fracture or mechanical break, 45	ш	cavities 3/16"-3/4"	_
	R8-NQ	23	>10	deg, rough, undulating, open	Ы	107.3-109.25' - pale yellowish brown, - (10YR 6/2), fine grained, weak to	
110	5 ft 74%	23	[ 10	108.4' - Fracture or mechanical break,	$\vdash$	medium strong (R2 to R3), voids	
-68.2				horizontal, rough, undulating, open	ш	over 10% of rock surface, no cavities	
-			>10	108.5' - Fracture or mechanical break, 45	H	<ul> <li>109.25-110.7' - pale yellowish brown,</li> </ul>	-
-				deg, rough, undulating, open 109.25-110.7' - Fracture zone, 60 deg and 80		(10YR 6/2), fine grained, weak to	Bo 45
			NR	deg, limestone rock fragments from 3/4"-2"	Щ	medium strong (R2 to R3), voids over 10% of rock surface, 10%	R8: 15 minutes
I -	112.0			<u> </u>	Н	cavities 3/16"-3/4"	Driller's Remark: Water
-	112.0				口	No Recovery 110.7-112.0'	level at 3.5'
-			>10	112.25,112.3' - Fracture (2), horizontal,	ш	_ Limestone	Driller's Remark: Hole
I -				rough, undulating, open	H	112.0-112.85' - pale yellowish brown,	collapse, advanced NW casing to 106.0', end -
			ا مر ا	112.4-113.0' - Fracture zone, limestone rock fragments from 1"-1.5"		(10YR 6/2), fine to medium grained, mild HCl reaction, weak (R2), voids	drilling on 6/03/07 at 17:00
I -			>10	113.55' - Fracture, 60 deg, rough, planar,	(1/16") over 5-10% of rock surface,	Driller's Remark:	
-	R9-NQ			open, black staining	Н	no visible cavities	Circulation loss at 113.0',
-	5 ft	22	1	113.7-114.0' - Fracture zone, limestone rock			drilling soft, not like a cavity
115	55%			fragments from 1.5"-3"	$\vdash$		
1							



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-21

SHEET 7 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723224.9 N, 458119.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DISCONTINUTIES   UTHOLOGY   COMMENTS	WATER	LEVELS : 3.5	ft bgs	on 6/	/03/07 START : 5/30/2007 END : 6/4	1/200	LOGGER : C. Dellaria, P. De Sa'	rego
117.0	<b>₹</b> □₽	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
117.0	ELO N G	AND ₹ (%)		ZES T	DESCRIPTION	O'C		SIZE AND DEPTH OF CASING.
117.0	TH B FACE	E RU STH, OVE	%) o	FOC	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
117.0	DEP SUR ELE	COR	Ø	FRA( PER		SYM	AND ROCK MASS CHARACTERISTICS	
117.0								
117.0	_			NR		世	brown, (10YR 7/4), trace cavities up	at 07:20 -
117.0						上	to 3/8"x3/8"	R9: 15 minutes
4		117.0			_	Ь	grayish orange, (N5 to 10YR 7/4),	
17.5 - Fracture, horizontal, rough, undulating, open   17.9 - Fracture, horizontal and 60 deg, rough, undulating, open   18.1 - Fractures (2), horizontal, rough, undulating, open   122.0   122.0   123.3 - Mechanical break   127.0 - 127.45 - Fracture zone   127.0	_			4		ь		
R10-NO   St   120	_				117.5' - Fracture, horizontal, rough,	$\vdash$		
R10-NO   S ft   1	-			3	undulating, open 117.9-117.9' - Fracture, horizontal and 60	F	<ul> <li>117.0-117.7' - medium gray, (N5),</li> </ul>	
120	-	_   R10-NO			deg, rough, undulating, open	H	fine to medium grained, mild HCl reaction, weak to medium strong (R2	-
122.0	-	- 5 ft			open -	Ħ	<ul><li>to R3), voids (up to 3/16") over 10%</li></ul>	-
122.0				NR	118.3, 118.4' - Fractures (2), horizontal,	Ħ	3/8"	_
122.0	-			IVIX	-	Ħ		-
22.0 + 122.19 - Fracture zone   122.3 + Gracture zone   122.4 + Gracture zone   122.5 + Gracture zon	-				-	世		R10: 10 minutes
22.0 + 122.19 - Fracture zone   122.3 + Gracture zone   122.4 + Gracture zone   122.5 + Gracture zon	_	122.0			-	世	-	1
122.85' - Fracture, horizontal, rough, undulating, open 123.0' - Mechanical break  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0-127.45' - Fracture zone 127.6' - Fracture, horizontal, rough, undulating, open 127.8' - Fracture, horizontal, rough, undulating, open 127.8' - Fracture, horizontal, rough, undulating, open 127.8' - Fracture, horizontal, rough, undulating, open 128.3' - Mechanical break 130	_			>10		H		
R11-NO 125				/10		H	7/4), fine to medium grained, mild	
R11-NO 5 ft 22% NR NR	_				undulating, open		HCl reaction, weak (R2), voids (up to 1/16") over 10% of rock surface.	
127.0	_				123.0' - Mechanical break -	H	trace cavities up to 3/8"x3/16"	_
127.0	-	- 5 ft	14	NR	-	H	No Recovery 123.1-127.0	-
127.0  127.0-127.45' - Fracture zone 127.0-127.45' - Fracture zone 127.8' - Mechanical break 128.0-128.1' - Fracture, horizontal, rough, undulating, open 128.3' - Mechanical break 130.27% 130.27% 130.3' - Mechanical break 132.4' - Fracture, horizontal, rough, undulating, open 132.2' - Mechanical break 132.4' - Fracture, horizontal, rough, undulating, open 132.0'  132.0  1 132.2' - Mechanical break 132.4' - Fracture, horizontal, rough, undulating, open 133.0' - Mechanical break 132.4' - Fracture, horizontal, rough, undulating, open 133.0' - Mechanical break 132.0' - Mechanical break 132.1' - Mechanical break 132.2' - Mechanical break 132.3' - Mechanical break 132.4' - Fracture, horizontal, rough, undulating, open 133.0' - Mechanical break 133.0' - Mechanical brea		22%				┢	<u> </u>	_
127.0  127.0-127.45' - Fracture zone  127.6' - Fracture, horizontal, rough, undulating, open 127.8' - Mechanical break 128.0-128.1' - Fracture, horizontal, rough, undulating, open 127.8' - Mechanical break 128.0-128.1' - Fracture, horizontal, rough, undulating, open 128.3' - Mechanical break  130.0-128.1' - Fracture, horizontal, rough, undulating, open 128.3' - Mechanical break  130.3' - Mechanical break  130.3' - Mechanical break  132.0-132.6' - grayish orange to pale yellowish brown, (10/YR 6/2), fine to medium grained, mild HCI reaction, weak (R2), voids (up to 1/16") over 10% of rock surface, trace cavities up to 3/8"x3/16" No Recovery 128.35-132.0'  R12: 12 minutes  From 125.5-128' R11: 6 minutes  Driller's Remark: Several soft zones, probably not cavities  127.0-127.1' - pale yellowish brown, (10/YR 6/2), fine to medium grained, mild HCI reaction, weak (R2), voids (up to 1/16") over 10% of rock surface, cavities up to 3/8"x3/16" No Recovery 128.35-132.0'  R12: 12 minutes  Driller's Remark: Cavities from 133.5-136.0' and 135.5-136.0' and 135.5-136.0'  Driller's Remark: Cavities from 133.5-136.0' and 135.5-136.0'	-				-	口	-	Driller's Remark: Cavity
127.0   127.0   127.0-127.45' - Fracture zone   127.0-127.1' - pale yellowish brown, (10'NR 6/2), fine to medium grained, mild HCl reaction, weak (R2), voids (10'NR 7/4), fine to medium grained, mild HCl reaction, weak (R2), voids (10'NR 7/4), fine to medium grained, mild HCl reaction, weak (R2), voids (10'NR 7/4), fine to medium grained, mild HCl reaction, weak (R2), voids (10'NR 7/4), fine to medium grained, mild HCl reaction, weak (R2), voids (10'NR 7/4), fine to medium grained, mild HCl reaction, weak (R2), voids (10'NR 7/4) fine to medium grained, mild HCl reaction, weak (R2), voids (10'NR 7/4) fine to medium grained, mild HCl reaction, weak (R2), voids (10'NR 7/4) to 10'NR 6/2), fine to medium grained, mild HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over 133.5-135.0' and 135.5-136.0'	-				-	仜	-	from 125.5-128'
127.0-127.45' - Fracture zone  127.0-127.45' - Fracture zone  127.0-127.45' - Fracture, horizontal, rough, undulating, open 127.8' - Mechanical break 128.0-128.1' - Fracture, horizontal, rough, undulating, open 128.3' - Mechanical break 130.3' - Mechanical break 132.0  1 1 1 32.2' - Mechanical break 132.4' - Fracture, horizontal, rough, undulating, open 132.0 - R13-NQ 5 ft	-	127.0			-	仜	-	K11. 6 minutes
127.6' - Fracture, horizontal, rough, undulating, open 127.8' - Mechanical break 128.0-128.1' - Fracture, horizontal, rough, undulating, open 128.3' - Mechanical break 128.0' - MR  130	-	127.0			127.0-127.45' - Fracture zone	┢		
mild HCI reaction, weak (R2), voids (1/16") over 5-10% of rock surface 127.1-128.35' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine to medium grained, mild HCI reaction, weak to medium strong (R2 to R3), voids (1/16") over 15-10% of rock surface 127.1-128.35' - grayish orange to pale yellowish brown, (10YR 7/4) to 10YR 6/2), fine to medium grained, mild HCI reaction, weak (R2), voids (up to 1/16") over 10% of rock surface, trace cavities up to 3/8"x3/16"  No Recovery 128.35-132.0'  Limestone  132.0-132.6' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine to medium grained, mild HCI reaction, weak to medium strong (R2 to R3), voids (1/16") over 15% of rock surface, cavities (3/8"x1/16") over 5-10%  Driller's Remark: Cavities from 133.5-135.0' and 135.5-136.0'	_			>10			- 127.0-127.1' - pale yellowish brown, (10YR 6/2), fine to medium grained,	
R12-NQ - 5 ft 7 - 88.2  NR  128.0-128.1' - Fracture, horizontal, rough, undulating, open 128.3' - Mechanical break  NR  130.3' - Mechanical break  130.3' - Mechanical break  132.0  1 132.2' - Mechanical break  132.2' - Mechanical break  132.4' - Fracture, horizontal, rough, undulating, open  R13-NQ - 5 ft 8  R13-NQ - 5 ft 8				2		$\vdash$	mild HCl reaction, weak (R2), voids	]
130 27%   7					128.0-128.1' - Fracture, horizontal, rough,	F	127.1-128.35' - grayish orange,	
130 27%	_	-:	7			F	<ul> <li>mild HCl reaction, weak (R2), voids</li> </ul>	
132.0  1 132.2' - Mechanical break  132.4' - Fracture, horizontal, rough, undulating, open  R13-NQ 5 ft   8   130.3' - Mechanical break  130.3' - Mechanical break  132.0'   No Recovery 128.35-132.0'    Limestone   132.0-132.6' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine to medium grained, mild HCI reaction, weak to medium strong (R2 to R3), voids (1/16") over 15% of rock surface, cavities (3/8"x1/16")    Driller's Remark: Cavities from 133.5-135.0' and 135.5-136.0'					_	F	(up to 1/16") over 10% of rock	-
Limestone 132.0   1	- 50.2			NR	130.3' - Mechanical break -	H	- 3/8"x3/16"	-
Limestone  132.0' - Mechanical break 132.4' - Fracture, horizontal, rough, undulating, open  Limestone 132.0-132.6' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine to medium grained, mild HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over 15% of rock surface, cavities (3/8"x1/16") over 5-10%  Driller's Remark: Cavities from 133.5-135.0' and 135.5-136.0'	-				-	F	NO Recovery 128.35-132.0'	R12: 12 minutes
Limestone 132.2' - Mechanical break 132.4' - Fracture, horizontal, rough, undulating, open  Limestone 132.0-132.6' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine to medium grained, mild HCI reaction, weak to medium strong (R2 to R3), voids (1/16") over 15% of rock surface, cavities (3/8"x1/16") over 5-10%  Driller's Remark: Cavities from 133.5-135.0' and 135.5-136.0'	-	122.0			-	Ħ	-	-
132.4' - Fracture, horizontal, rough, undulating, open  132.4' - Fracture, horizontal, rough, undulating, open  132.4' - Fracture, horizontal, rough, yellowish brown, (10YR 7/4 to 10YR 6/2), fine to medium grained, mild  HCI reaction, weak to medium strong (R2 to R3), voids (1/16") over 15% of rock surface, cavities (3/8"x1/16")  132.4' - Fracture, horizontal, rough, undulating, open  132.0-132.6' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine to medium grained, mild  HCI reaction, weak to medium strong (R2 to R3), voids (1/16") over 15% of rock surface, cavities (3/8"x1/16")  132.5-136.0'	-	132.U		1	132 2' Machanical brook	Ħ		
undulating, open  6/2), fine to medium grained, mild HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over 15% of rock surface, cavities (3/8"x1/16")  7	-			•	132.4' - Fracture, horizontal, rough,	Ħ	- 132.0-132.6' - grayish orange to pale vellowish brown. (10YR 7/4 to 10YR	
R13-NQ (R2 to R3), voids (1/16") over 15% of rock surface, cavities (3/8"x1/16") over 5-10% (R2 to R3), voids (1/16") over 15% of rock surface, cavities (3/8"x1/16") and 135.5-136.0'	_				undulating, open	H	6/2), fine to medium grained, mild	1
R13-NQ						片	(R2 to R3), voids (1/16") over 15% of	
1 1 55 1 1.5 1.5	_		8			片		
	135			NR		H		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-21

SHEET 8 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723224.9 N, 458119.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, NQ tools, HW casing

				100/07 CTART: 5/00/0007 FNR: 00		7	ORIENTATION . Vertical
	LEVELS : 3.5	πbg	s on 6/	<u>03/07 START : 5/30/2007 END : 6/</u> DISCONTINUITIES	4/200	7 LOGGER : C. Dellaria, P. De Sa'r LITHOLOGY	ego COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)				8	LITHOLOGY	COIVIIVIENTS
N A P C	ZAZ ZZZ	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H B ATIC	J. F. F.	(%) <sub>Q</sub>		DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Į,	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FF 등	NG S	Ø	RAC FIRE	PLANARITY, INFILLING MATERIAL AND	₽	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SE	SHR	ď	F H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	Bitor 6, 1201 (1200216, 210.
-93.2					Ш		
_					$\perp$	<del>-</del>	_
-					1	Limestone	R13: 9 minutes
-					╀	<ul> <li>137.0-138.8' - medium light gray,</li> </ul>	-
_	137.0			407.0.407.451.5		(N6), fine grained, strong HCl	_
I _			>10	137.0-137.15' - Fracture zone, limestone rock fragments up to 1"	┢	reaction, medium strong to strong - (R3 to R4), trace voids (to 3/16")	_
			- 10	137.5' - Fracture, <10 deg, smooth,		over rock surface, 15% cavities up to	
				undulating	╙	1/4"x3/16" partly infilled with	1
-			1	137.65' - Fracture, horizontal, rough,	仜	<ul> <li>yellowish gray (5Y 7/2) mottling around cavities (similar to</li> </ul>	-
-	R14-NQ			undulating, open 3/4" likely due to large cavity	╁	132.0-132.6'), fossiliferous, some	-
_	5 ft	44	4	138.7-138.95' - Fracture, 60 deg, rough,	Ė	- cavities extend through core	-
140	92%			undulating, open	₽	138.8-140.9' - very pale orange to	
-98.2			>10	138.75, 139.15, 140.4' - Mechanical break (3) 139.05, 139.4, 139.8' - Fractures (3), 15 deg.	Ш	medium light gray, (10YR 8/2 to N6), from 140.6-140.9', cavities (up to	
			> 10	rough, undulating, open	1	3/16") over 20% of rock surface	]
_			0	39.9-140.8' - Fracture zone (same as 13	(same as 137.0-138.8').	R14: 30 minutes	
-			NR		₩	L 140.9-141.2' - cavities absent (same as 137.0-138.8').	-
-	142.0		INE	142.0-142.15' - Fracture zone, fragments up	t	141.2-141.6' - pale yellowish brown,	-
_			>10	to 1"	╁	(10YR 6/2), fine grained, mild HCl	-
				142.7' - Fracture, horizontal, rough,		reaction, medium strong (R3), trace	SC-2 collected at 142.8-
			0	undulating, open		voids (1/16") over surface of rock, no visible cavities	143.65'
			"			No Recovery 141.6-142.0'	Driller's Remark: Possible
-	R15-NQ				┰	Limestone	cavity from 143.5-145.5' – Light drill chatter to heavy
- 445	5 ft	48	NR		Ľ	142.0-142.6' - pale yellowish brown to grayish orange, (10YR 6/2 to	drill chatter
145_ -103.2	66%			_	₩	10YR 7/4), fine to medium grained,	<del></del>
-			1		乚	_ moderate to strong HCl reaction,	-
_				145.9' - Fracture, horizontal, rough,	╆	voids (up to 1/16") over 10% of rock surface, trace cavities up to	
			2	undulating, open		3/8"x1/16"	R15: 19 minutes
	147.0		-	146.5, 146.7' - Fractures (2), horizontal,	Н	142.6-143.65' - light brownish gray,	
				rough, undulating, open 147.0-147.1' - Fracture, horizontal, rough,	ш	(5YR 6/1), fine grained, moderate to strong HCl reaction, trace voids (up	1
-			>10	undulating, open	╁	to 1/16") over rock surface	-
-				147.5-147.85' - Fracture zone, limestone rock	亡	No Recovery 143.65-145.5'	-
-			0	fragments from 1/2"-1"	╨	Limestone 145.5-147.0' - Same as 132.0-132.6'	-
-	D40.110				╙	except weak (R2), coarse gravel,	-
_	R16-NQ 5 ft	33	3	149.15' - Fracture, horizontal, rough,	╁╌	voids (up to 1/16") over 20% of rock	_
150_	86%			undulating, open 149.3-149.6' - Fractures or mechanical —		surface — 147.0-147.85' - pale yellowish brown,	
-108.2				break, 30 deg and 20 deg, smooth, planar,	$\vdash$	(10YR 6/2), fine to medium grained,	
1 7			>10	open	Ш	moderate to strong HCl reaction,	1
1 -			0	150.2-150.6' - Fracture zone 150.9-151.1' - Fracture zone, limestone rock	╁	<ul> <li>weak to medium strong (R2 to R3), voids (up to 1/16") over 15% of rock</li> </ul>	R16: 33 minutes
-			NR	fragments from 3/4"-1.5"		surface, cavities (1/16"x3/16") trace	-
-	152.0				$\vdash$	147.85-150.2' - Same as	-
-					-	147.0-147.85' except light gray, (N7), medium strong (R3), trace voids,	-
1 -					1	trace cavities up to 1/16" diameter	_
					1	150.2-151.3' - Same as	
					1	147.0-147.85' except pale yellowish brown, (10YR 6/2), weak to medium	
1 7						strong (R2 to R3), voids (up to 1/16")	]
1 -				•	1	over 15% of rock surface, cavities	
					1	(3/16"x3/4") over 15-20%	
					1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-21	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723224.9 N, 458119.4 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 3.5	ft bgs	s on 6/	/03/07 START : 5/30/2007 END : 6/4	END : 6/4/2007 LOGGER : C. Dellaria, P. De Sa'rego					
				DISCONTINUITIES		LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEDTH OF CASINO			
H BE ACE ATIO	TH./	(%)	TUR:	DEPTH. TYPE. ORIENTATION. ROUGHNESS.	OLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS.	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND			
EPT URF LEV	ENG	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
ООШ	074	œ	шФ	THIORNESO, OUTLI AGE GTAINING, AND HOTTINESO	S	No Recovery 151.3-152.0'				
-				-		Bottom of Boring at 152.0 ft bgs on	-			
-				-		_ 6/4/2007	-			
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-22	SHEET	1	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723410.3 N, 458287.4 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 1.61 ft k	ogs on 6/°	14/07	START : 5/19/2007 END : 5/21/2007 LOGGER	: R.	Gomez
				STANDARD	SOIL DESCRIPTION	G	COMMENTS
AND AND (#)	SAMPLE	AMPLE INTERVAL (ft) PENETRATION TEST RESULTS SOIL NAME, USCS GROUP SYMBOL, COLOR,					DEDTIL OF CACING DOULING DATE
H BE ATIO		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR	BOLI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
40.5	0.0				Topsoil (5)(D.0.(2))	7/1/	Boring drilled in wetlands area
		0.7	SS-1	0-0-1 (1)	0 to 0.7' - dusky brown, (5YR 2/2), wet, very soft	1/.3	
	1.5			(.,			Water level is based on Ground Water  Monitoring at LNP site (FSAR Table -
_					_		2.4.12.08)"
-					_		Water levels not recorded during drilling
-	-				-		-
-					-		-
-	-				-		-
5	5.0				-		-
35.5	5.0				Poorly Graded Sand (SP)		
-	-	0.9	SS-2	4-3-5	5.0-5.9' - moderate brown to grayish orange pink, (5YR 4/4 to 5YR 7/2), mottled, wet, loose, fine		-
-	6.5			(8)	grained, trace non-plastic fines, grading into clayey sand (SC) with 30% low to medium plasticity fines		-
					Sand (SC) with 30% low to medium plasticity lines		
_							_
_					_		_
-					_		-
-					-		-
-					-		5/19/07, 15:00, set 6" casing to 9.5'
10 <u> </u>	10.0				Silt (ML)	Ш	
-		1.0	SS-3	3-4-7	10.0-11.0' - grayish orange, (10YR 7/4), wet, stiff, very rapid dilatancy, strong HCl reaction, trace sand,		-
-	11.5			(11)	carbonate, sands are fine to grained		-
							_
-					_		_
-					_		-
-	-				-		-
45 -					-		-
15 <u> </u>	15.0				Silt (ML)	Ш	_
-	1	1.2	SS-4	13-13-10	15.0-16.2' - very pale orange, (10YR 8/2), wet, very stiff, 10 to 15% sand, very rapid dilatancy, strong HCl		-
-	16.5			(23)	- reaction, carbonate, 10-15% fine gravel-sized	Ш	<del>-</del>
1 -					\limestone fragments \ \ \ -		
-							_
-	-				-		-
-	-				-		-
	1				-		-
20							-
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PROJECT NUMBER:	BORING NUMBER:		
338884 FI	B-22	CHEET	2 OF 0

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723410.3 N, 458287.4 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 1.61 ft k	ogs on 6/1	14/07	START : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	` '	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE ATIO		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR  BEFORE OF CASING, DRILLING RATE,  DRILLING FLUID LOSS, TESTS, AND
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
20.5	20.0				Silt With Sand (ML)
_		0.8	SS-5	18-5-4 (9)	20.0-20.8' - very pale orange, (10YR 8/2), wet, stiff, 15 -       -
1 ]	21.5			(0)	HCI reaction, carbonate, sand is fine to medium /
					grained
-					
-					<b>-</b>
-					
-					
	05.0				
25 <u> </u>	25.0				Silt With Sand (ML)
-		1.0	SS-6	6-6-4	25.0-26.0' - grayish orange, (10YR 7/4), wet, stiff, 10 - to 15% gravel, 25% sand, nonplastic, rapid dilatancy,
-	26.5			(10)	mild to moderate HCI reaction, carbonate, sand is fine
					\to coarse grained, gravel is fine grained / -
					] [
-					
_					<b>.</b>
-					
30 10.5	30.0				Silt With Sand (ML) Heavy chattering at 30.0'
-		1.5	SS-7	32-28-50	30.0-31.5' - grayish orange, (10YR 7/4), wet, hard, 27% sand, nonplastic, very rapid dilatancy, moderate
-	31.5			(78)	HCl reaction, carbonate, sand is fine to medium
					grained
_					<u> </u>
-					
-					
-					
-	25.0				
35 5.5	35.0			15-50/6	Sandy Silt With Limestone Fragments (ML)  35 0.35 5' - pale yellowish grappe (10VR 6/2) gray
-	36.0	0.5	SS-8	(65/12")	motifing, moist, hard, 25 to 30% sand, low plasticity.
1 -	23.0				\rapid dilatancy, 40% moderate yellowish brown
					limestone fragments, HCl reaction strong for silt, mild   -
-					
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PROJECT NUMBER:	BORING NUMBER:					
338884 FI	R-22	CHEET	2	ΩE	•	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723410.3 N, 458287.4 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 1.61 ft k	ogs on 6/1	14/07	START : 5/19/2007 END : 5/21/2007 LO	GGER	: R.	Gomez
				STANDARD	SOIL DESCRIPTION		G	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	` '	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND
SUR!			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTATION
0.5	40.0				Silt With Sand (ML)		Ш	
		1.3	SS-9	5-4-6 (10)	40.0-41.3' - moderate yellowish brown, (10YR 5/4), wet, stiff, 26% sand, nonplastic, very rapid dilatancy	, ]		
	41.5			(.0)	mild HCl reaction, carbonate, sand is fine grained	]	Ш	
_								_
-						_		-
-	-					_		-
-	-					_		-
-						-		-
45	45.0					-		-
-4.5	45.0				Sandy Silt (ML)		Ш	
-		1.0	SS-10	3-3-2 (5)	45.0-46.0' - moderate yellowish brown, (10YR 5/4), wet, medium stiff, 25 to 30% sand, nonplastic, very			-
	46.5			(0)	rapid dilatancy, mild HCl reaction, sand is fine to medium grained			
_					(mediam granied	_/		_
_	-					_		-
-	-					_		Medium chattering/grinding
-	-					-		Lost and regained 80-90% of circulation
-						-		-
50	50.0					-		-
-9.5	30.0				Silty Sand With Limestone Fragments (SM)		Ш	5/20/07, 08:45 to 10:15, set HW casing to
		1.4	SS-11	7-3-3 (6)	50.0-51.4' - dark yellowish brown, (10YR 4/2), wet, loose, fine to coarse grained, 23% fines, moderate			50.0'
_	51.5			(-)	HCl reaction, 40% limestone fragments, limestone is moderate yellowish brown (10YR 5/4) with mild to	s /=	111	_
_	-				moderate HCI reaction	/ _		-
-	-					_		-
-						-		-
-						-		-
-	-					-		-
55	55.0					_		-
-14.5					Silty Sand With Limestone Fragments (SM) 55.0-56.15' - dark yellowish brown to pale yellowish		Ш	
_		1.2	SS-12	3-3-7 (10)	brown, (10YR 4/2 to 10YR 6/2), wet, medium dense	٠,		_
_	56.5			, ,	mild to moderate HCl reaction, fine to coarse graine 25-30% fines, 35% limestone fragments	ed,	ш	_
-	-				,			Heavy grinding leat 90 00% of circulation of
-	-					-		Heavy grinding, lost 80-90% of circulation at 57' -
-	-					-		-
-	1					-		-
-	1					-		-
60	1					_		-
1	1							



PROJECT NUMBER:	BORING NUMBER:				
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723410.3 N, 458287.4 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 1.61 ft l	ogs on 6/	14/07	START : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
표시인		RECOVE	ERY (ft)	120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
				(N)	
-19.5	60.0			4-17-32	Limestone Fragments  60.0-61.2' - grayish orange and olive gray, (10YR 7/4  5/20/07, 11:15, begin to set casing to 60.0'
l _		1.2	SS-13	(49)	and 5Y 4/1), mild to moderate HCl reaction, fine to
l _	61.5				coarse gravel-sized fragments, 25% silt and sand similar to SS-12
l _					
l _					<b>」</b>
_					<b>」</b>
_					<b>」</b>
_					<b>]</b>
_					<b>]</b>
65	65.0				
-24.5				0.00	Silty Sand With Limestone Fragments (SM) 65.0-65.9' - pale yellowish brown to moderate
l _		0.9	SS-14	6-6-3 (9)	yellowish brown, (10YR 6/2 to 10YR 5/4), wet, loose,
_	66.5			(-)	mild to moderate HCl reaction, fine to coarse grained, / 28% fines, 40-50% limestone fragments
					20 % illies, 40-50 % illilestotie tragilients
_					<b>」</b>
_					<b>」</b>
70	70.0				
-29.5					Silty Sand With Limestone Fragments (SM) 70.0-71.4' - pale yellowish brown to moderate
		1.4	SS-15	12-14-10 (24)	yellowish brown, (10YR 6/2 to 10YR 5/4), wet,
	71.5			(= 1)	medium dense, mild to moderate HCl reaction, fine to coarse grained, 30% fines, 40-50% limestone
					fragments
					60% circulation loss
_					<b>]</b>
_					<b>]</b>
75	75.0	0.1	SS-16	50/2	A Limestone Fragments 5/20/07 15:30 begin to advance HW casing
-34.5	75.1	\	00 10	(50/2")	75.0-75.1' - pale yellowish brown, (10YR 6/2),
					\fragments up to 1-3/16 \fragm
					See the next sheet for the rock core log
					] [
					] [
					] [
					] [
					] [
					11
80					11
				·	



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723410.3 N, 458287.4 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 1.6	1 ft bo	gs on 6	S/14/07 START : 5/19/2007 END : 5/	21/200	7 LOGGER : R. Gomez	
≥0€	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
ON (	NA AND 3Y (%		ZES T	DESCRIPTION	O C	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING.
FACE MATIC	E RU STH, OVE	R Q D (%)	FOCT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQI	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-34.5	75.0					Limestone	Begin rock coring on
-			>10	75.5-76.0' - Mechanical break, multiple	Н	- 75.0-75.5' - very pale orange, (10YR 8/2), strong HCl reaction, medium	5/21/07 at 08:02
-			0	irregular breaks	H	strong (R3), moderately fossiliferous,	-
-			$\overset{\circ}{-}$	•	Ħ	voids up to 1/4" over 20-30% of surface	-
_	R1-HQ				H	75.5-76.7' - pale yellowish brown,	-
-	5 ft 34%	20			H	<ul> <li>(10YR 6/2), moderate to strong HCI reaction, weak to medium strong (R2</li> </ul>	-
_			NR		Ш	to R3), voids up to 3/8" over 20-30% of surface	_
					Н	No Recovery 76.7-80.0'	
_					Н	_	R1: 5 minutes
80	80.0				囯	<del>-</del>	_
-39.5			>10	80.0-81.0' - Fracture zone, irregular breaks, some mechanical breaks	Щ	Limestone - 80.0-83.1' - pale yellowish brown,	_
_					ш	(10YR 6/2), strong HCl reaction, very	_
_			1	81.1' - Fracture, 50-55 deg, rough, planar, dark grey staining	Ш	weak to weak (R1 to R2), trace solution cavities up to 3/8",	SC-1 collected at 81.1- 81.95'
_	DO HO			82.0-82.6' - Fracture zone, irregular breaks	╁┼	moderately fossiliferous, 10-20% voids up to 1/16", 5-10% silt	-
_	R2-HQ 5 ft	23	>10		H	- Voids up to 1/10 , 3-10 /0 silt	-
-	62%		1	82.6' - Fracture, 50-60 deg, rough, planar	H	- No December 00 4 05 0	-
-					H	No Recovery 83.1-85.0'	-
-			NR		甘	-	R2: 5 minutes
85	85.0				ш	-	-
-44.5	00.0			_	Ш	Limestone	Driller's Remark: Drilling is
-			2	85.7, 85.9' - Mechanical break (2), rough,	H	- 85.0-86.6' - Same as 80.0-83.1' except solution cavities up to	soft 85.0-87.5' -
_			2	planar	Ш	9/16"over 5-10% of surface	-
_				86.1' - Fracture, horizontal, rough, planar		No Recovery 86.6-90.0'	-
	R3-HQ 5 ft	20			Ш	_	
_	32%	20			Щ	_	_
_			NR		Ш	_	Driller's Remark: Core barrel has no resistance at -
_					Ш	-	88.0-90.0'
-					Н	-	R3: 5 minutes
90 <u> </u>	90.0		1	_	冄	Limestone	 Driller's Remark: No
- '0.5			$\vdash \uparrow$		冊	90.0-90.2' - Same as 80.0-83.1'	resistance to drilling 90.0-
-					Ħ	No Recovery 90.2-95.0'	95.0'
-					甘	-	-
-	R4-HQ				丗	-	-
-	5 ft 4%	0	NR		H	-	-
-	7/0				╫	-	-
[ -					甲	-	-
-				•	囯	-	R4: 2 minutes
95	95.0				世	-	_
					1		



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723410.3 N, 458287.4 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 1.6	1 ft bo	gs on 6	S/14/07 START : 5/19/2007 END : 5	/21/20	07 LOGGER : R. Gomez	
<b>≩</b> □ <i>⊋</i>	<u>(</u>			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
ELO N (f	ANE 3 ANE 3 C		ZES T	DESCRIPTION	O LC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURF SURF SLEV	SOR	RQ	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	. XME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-54.5	014	ш.		95.0-96.3' - Fracture zone, multiple fractures	1	Limestone	
_			>10	and mechanical breaks, fragments range	F	<ul> <li>95.0-96.3' - pale yellowish brown,</li> </ul>	-
_			>10	from 0.05' in length to 0.4' in length	#	(10YR 6/2), very strong HCl reaction, very weak to weak (R1 to R2), 30%	-
_					世	<ul> <li>voids up to 1/4", 20-30% silt ^</li> </ul>	-
_	R5-HQ				+	No Recovery 96.3-100.0'	-
_	5 ft	0			+	-	-
_	26%		NR		+	-	-
_					$\pm$	-	-
_					+	-	R5: 3 minutes
400					F	-	=
100 <u> </u>	100.0		-	100.0-101.0' - Fracture zone, irregular	1///	Silty Clay (CL)	-
-			>10	fragments			-
-			1	404.01 Fracture F0.60 description	+	(10YR 6/2), stiff to very stiff, moderate plasticity, strong HCl	-
-				101.2' - Fracture, 50-60 deg, rough, planar, open	+	- \reaction, carbonate	-
_	R6-HQ			·	#	Limestone 100.5-101.5' - light brown, (5YR 6/4),	-
_	5 ft 30%	0				strong HCl reaction, extremely weak	-
_	30 / 0		NR		+	to very weak (R0 to R1), 10-20% voids up to 1/16", poorly fossiliferous	-
_					1	No Recovery 101.5-105.0'	-
_					世	-	R6: 3 minutes
105	105.0					-	-
-64.5	103.0			105.0-105.6' - Fracture zone, irregular pieces	╁	Limestone	
_			>10	up to 3/4"	$\perp$	<ul> <li>105.0-108.9' - grayish orange, (10YR 7/4), strong HCl reaction, extremely</li> </ul>	SC-2 collected at 105.7-
_					+	weak to very weak (R0 to R1), trace	106.8'
_			2	400.01.5	1	<ul> <li>voids, poorly fossiliferous, silty</li> </ul>	-
	R7-HQ		- 10	106.8' - Fracture, rough, stepped, 3/8" relief on face of fracture		-	_
	5 ft 78%	22	>10	106.9' - Fracture, smooth, stepped, 5/16"	1	-	_
			>10	relief 107.0-108.0' - Fracture zone, rough, planar,	$\perp$	<u> </u>	1
			-10	less than 1/8" infilling 108.0-108.9' - Fracture zone, rough, planar,	$\perp$	Ī	Drillaria Domaria Hand at
			NR	fractures and mechanical breaks	$\perp$	No Recovery 108.9-110.0'	Driller's Remark: Hard at – 109.0'
	110.0		1417		$\mathbf{L}$		R7: 5 minutes
-69.5			<b>&gt;10</b>	110.0-110.2' - Fractures (2), horizontal and	$\mathbf{F}$	<b>Limestone</b> - 110.0-110.2' - grayish orange, (10YR	]
			>10	vertical, rough, undulating 110.8-111.0' - Fractures, multiple, irregular	]	7/4), strong HCl reaction, very weak	]
			0	gravel-size pieces, 0.1' to 0.2' in size	片	to weak (R1 to R2), 10-15% voids up to 1/16", silty	]
					上	110.2-111.0' - pale yellowish brown,	]
	R8-HQ	7			$\mathbb{F}$	(10YR 6/2), strong HCl reaction, weak (R2), 20-30% voids up to 3/16"	]
	5 ft 7 28%				I	111.0-111.4' - pale yellowish brown,	
			NR		上	(10YR 6/2), strong HCl reaction, weak (R2), 30% voids up to 3/8"	
					$\perp$	No Recovery 111.4-115.0'	
						-	R8: 2 minutes
115	115.0						



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723410.3 N, 458287.4 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

00			2011 11	TENT . CIVIE 550X 5/N 540255, Mud Totally, Fig tools, Fi	• 000	ni ig		ORIENTATION : Vertical
WATER	LEVELS: 1.6	1 ft b	gs on (	6/14/07 START: 5/19/2007 END: 5	/21/20	07	LOGGER : R. Gomez	
I				DISCONTINUITIES	(D	Γ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	T	DOOK TVDE COLOR	
E A O	Z Z Z	œ l	FRACTURES PER FOOT	DEGGINE HON	<u> </u>		ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
AAC	IN TES	(%) Q	ĮΞΫ́	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ĭ		WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
뚜뚜릿	N S S S S S S S S S S S S S S S S S S S	οD	AC R F	PLANARITY, INFILLING MATERIAL AND	₹	ı	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
교외교	SHR RES	A O	FB	THICKNESS, SURFACE STAINING, AND TIGHTNESS	ς		CHARACTERISTICS	5.101 0, 1201 NEODETO, 210.
-74.5				115.0-115.2' - Mechanical break, multiple	$\Box$	T	Limestone	
-			>10	irregular breaks, gravel-size pieces,	+-	╁	115.0-115.35' - pale yellowish brown,	_
_				0.05'-0.15' in size	1	L	(10YR 6/2), strong HCl reaction,	_
			3	115.7, 116.0' - Fractures (2), horizontal,		1	extremely weak (R0), 20-30% voids	Disaggregated limestone
-				rough, planar, horizontal	1111	T'	<1/16"	-
-	B0 110				4111	F	\ 115.35-116.0' - Same as \ \ 115.0-115.35' except grayish orange, \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-
	R9-HQ 5 ft	17				L	(10YR 7/4)	_
	30%	17			111	Г	Silt And Sand-Sized Carbonate	_
_	0070		NR		1	H	Grains With Clay	-
_			INE		4111	F	116.0-116.5' - medium gray, (N5),	_
						1	nonplastic to low plasticity, trace	
_					111	Γ	solution cavities up to 3/8",	R9: 2 minutes
					111	H	unconsolidated	-
120	120.0			-	411	L	No Recovery 116.5-120.0'	Biographical in the second sec
-79.5			۱ ،		Щ	L	Silt And Sand-Sized Carbonate	Disaggregated limestone
I -			2	120.45' - Fracture, 30 deg, rough, planar,	$\vdash$	₽,	Grains With Clay 120.0-120.4' - Same as 116.0-116.5'	I -
-				lithologic contact	+	+	Limestone	
l -			6	120.6' - Fracture, 30 deg, rough, planar 121.0, 121.3, 121.45, 121.5, 121.55, 121.6,' -		1	120.4-121.0' - pale yellowish brown,	_
				Fractures (6), horizontal, smooth, planar	ш	1	(10YR 6/2), strong HCl reaction,	
_	R10-HQ		1 /	Tractures (0), Horizontal, Simootil, planal	1	╁	extremely weak (R0), 20-30% voids	_
-	5 ft	20			+	╊	up to 1/16"	-
_	42%				$\perp$	Į.	121.0-121.65' - pale yellowish brown,	_
					$\vdash$	1	(10YR 6/2), medium grained, 10-20%	
_			NR		7	t	fines, strong HCl reaction, very weak	-
-					-	1	to weak (R1 to R2), 20-30% voids up to 1/16", poorly fossiliferous, cyclic	R10: 3 minutes
_					ᅪ	Ł	bedding	R 10. 3 minutes
125	125.0				$\vdash$	ł	121.65-122.1' - coarse grained, weak	
-84.5				– 125.1' - Fracture, horizontal, rough, planar,	仜	T	HCl reaction, very weak (R1), 5-10%	
-			3	1/16" thick infilling, open	╁	₽	solution cavities, 20-30% voids,	_
_				125.25' - Fracture, horizontal, rough,	╨	╁	highly fossiliferous	_
				undulating, 1/16" thick infilling, open	h	1	No Recovery 122.1-125.0'	
_					T	1	Limestone	-
_	D44 HO				₩	₽	125.0-125.25' - yellowish gray, (15Y 7/2), coarse grained, mild to	-
I _	R11-HQ 5 ft	12			$\bot$	L	moderate HCl reaction, very weak	_
	18%	12	ND			1	(R1), trace solution cavities up to	
I -			NR		1	╁	1/4", 10-20% voids up to 3/16"	1
-					+	╁	125.25-125.5' - Same as	-
I _					上	1	125.0-125.25' except pale yellowish	_
I -					ш	1	brown, (10YR 6/2)	R11: 2 minutes
-					+	╁	125.5-125.9' - Same as 125.0-125.25'	-
130 -89.5	130.0			120 0 122 0! Mochanical brook multiple	+	╁	No Recovery 125.9-130.0'	
-69.5			>10	130.0-132.0' - Mechanical break, multiple	<b>_</b>	1	Silty Clay (CL)	_
			10			ľ	130.0-103.3' - dark yellowish orange,	
-					1	H	(10YR 6/6), stiff, mild to moderate	
_			>10		-	F	HCI reaction	_
					Щ	$\lfloor 1  angle$	Poorly Graded Sand (SP)	
	R12-HQ			132.1' - Fracture, horizontal, rough,	$\perp$	Г	130.3-131.6' - grayish orange to	1
-	5 ft	0	>10	undulating	++	†	moderate yellowish brown, (10YR 7/4	-
I -	60%			132.5-132.8' - Fracture zone, multiple breaks,	$\perp$	1	to 10YR 5/4), fine to coarse grained,	_
				infilling	$\vdash$	1	slow HCI reaction	
I -					1	ſ		<u> </u>
-			NR		世	1		R12: 5 minutes
-					+-	Ŧ.		- 1712. 5 minutes
135	135.0				$\vdash$	1		
					1	Г		
					1			
						_		



PROJECT NUMBER:

338884.FL

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723410.3 N, 458287.4 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 1.6	31 ft b	gs on 6	6/14/07 START : 5/19/2007 END : 5	/21/20	07 LOGGER : R. Gomez	
≥∩≘	_ (9			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-94.5 _			>10	135.0-138.3' - Mechanical break, multiple	H	Limestone 131.6-133.0' - grayish orange, (10YR 7/4), moderate to strong HCl	-
			>10		Ħ	reaction, very weak to weak (R1 to R2), trace solution cavities up to 5/16", 20-30% voids up to 1/16",	-
-	R13-HQ 5 ft   66%	0	>10		芦	poorly to moderately fossiliferous, 20-30% silt No Recovery 133.0-135.0'	-
-	00%		1			Limestone - 135.0-135.3' - grayish orange, (10YR 7/4), moderate to strong HCl	-
140	140.0		NR		Ħ	reaction, very weak to weak (R1 to R2), trace solution cavities up to 5/16", 20-30% voids up to 1/16",	R13: 8 minutes
-99.5 -	1 10.0		3	140.2, 140.4, 140.75' - Fractures (3), rough, planar, along weak contact		poorly to moderately fossiliferous, 20-30% silt 135.3-137.5' - very light gray, (N8),	-
			1	141.2' - Fracture, 60-70 deg, smooth, planar	Ē	very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), solution cavities up to 3/4" in	-
-	R14-HQ 5 ft 94%	28	2	141.8' - Fracture, horizontal, rough, planar, infilling 142.6' - Fracture, 60-70 deg, smooth, planar	#	diameter, 5-10% voids, moderately fossiliferous 137.5-138.3' - pale yellowish brown,	-
			>10	142.9' - Mechanical break, rough, along weak contact 143.1-144.7' - Fracture zone, possible	$\exists$	(10YR 6/2), medium to coarse grained, moderate HCl reaction, very weak to weak (R1 to R2), solution	-
145	145.0		5 NR	mechanical breaks	Ħ	cavities up to 3/16", 10-15% voids <1/16", silt, moderately fossiliferous No Recovery 138.3-140.0'	R14: 5 minutes
-104.5 _			>10	145.2-145.4' - Fractures, gravel-sized pieces	Ė	Limestone 140.0-140.5' - grayish orange and pale yellowish brown, (10YR7/4 and	-
			0	145.85-145.95' - Fractures, horizontal, rough, planar, open 146.4-146.5' - Mechanical break, multiple	#	<ul> <li>10YR 6/2), fine grained, strong HCI reaction, very weak to weak (R1 to R2), laminated bedding</li> <li>140.5-140.8' - dark yellowish brown,</li> </ul>	-
	R15-HQ 5 ft 84%	53	0	147.15' - Mechanical break		(10YR 4/2), no HCl reaction, extremely weak to very weak (R0 to R1), laminated bedding, 10-15%	SC-3 collected at 148.15-149.05' (SC-3 depth adjusted from
_			>10	148.4-148.75' - Mechanical break	井	small (<1/16") voids, 30-40% cavities (<3/8"), moderately fossiliferous, silty 140.8-143.0' - Same as 140-140.5'	148.5-149.05' due to change in accounting for core loss)
	150.0		0 NR	148.9' - Fracture, horizontal, rough, planar, open, fragments don't fit together		143.0-144.7' - dark yellowish brown, (10YR 4/2), mild to moderate HCl reaction, extremely weak to very	R15: 5 minutes
-109.5 - -					-	weak (R0 to R1), 20-30% voids <1/16", moderately fossiliferous, silty No Recovery 144.7-145.0' Limestone	Total depth of boring 150.0' -
-					1	145.0-146.05' - moderate yellowish brown, (10YR 5/4), medium to coarse grained, moderate HCI	-
						reaction, very weak (R1), 5-10% solution cavities up to 1/4", 20-25% voids	-
					-	146.05-148.8' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), fine grained, mild HCl reaction, weak to medium strong (R2	-
						to R3), trace cavities and voids	



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	B-22	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723410.3 N, 458287.4 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING	NETHODA	ND EC	אורוע	MENT: CME 550X S/N 340253, mud rotary, HQ tools, HI	v casi	irig		ORIENTATION : Vertical
\\/\TED	I EVELS : 1 6	1 ft h	ac on i	6/14/07 START : 5/19/2007 END : 5	21/20	07	LOGGER : R. Gomez	
WATER	LEVELS : 1.6	יוונט(	45 OH (		<u> 2 1/20</u>	0/		
>	<u>-</u>			DISCONTINUITIES	ניו	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		m	DESCRIPTION	SYMBOLIC LOG	Г	DOOK TYPE COLOR	
	z₹≿	_	₩_	DESCRIPTION	J C		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
프일본	SHA	(%) Q	FRACTURES PER FOOT	DEDTH TYPE OPIENTATION POLICHNESS	$\exists$	1	MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
ĮĘŽ≶	# <u>p</u>	0	D.F.	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	β		WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
유승교	유민의	Ø	RA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	≥		CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ОΩШ	SIR	ď	ΞД	THICKNESS, SON ACE STAINING, AND HOTTINESS	S			
						П	148.8-149.2' - moderate yellowish	
I -					4	F	brown, (10YR 5/4), mild HCl reaction,	-
							weak (R2), laminated bedding, 5%	
_					1	r	cavities up to 1-1/2"x1/2"	-
					1	L	No Recovery 149.2-150.0'	_
-					-	H	Bottom of Boring at 150.0 ft bgs on	-
							5/21/2007	
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-23	SHEET	1	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.7 N, 458210.1 E (NAD83)

ELEVATION: 40.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 240, mud rotary, cathead, AWJ/NWJ rods, 3-15/16" tri-cone bit

DNILLIN	GIVIETH	JU AND	EQUIFIVII	ENT DIELITOTO	0 S/N 240, mud rotary, cathead, AWJ/NWJ rods, 3-15/16" tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 2.3 ft bo	gs on 4/18	3/07	START : 4/11/2007 END : 4/19/2007 LOGGER : J. Schaeffer, D. Roraback
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	J (ft)	PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
N Y A	,VII LL			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, 으로 DEPTH OF CASING, DRILLING RATE,
ACE		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR 💆 DRILLING FLUID LOSS, TESTS, AND
FERS			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
				(N)	
40.7	0.0				Fill  0.0-0.3' - Fill material, road import fill  Driller use 10' section of NWJ rod then AWJ rods for SPT sampling.
		1.0	SS-1	2-2-5	0.3-0.5' wood fragments
-	4 -			(7)	Poorly Graded Sand With Silt (SP-SM)  S. Hutchinson performed cathead hammer
-	1.5				\ 0.5-1.0' - brownish black, (5YR 2/1), moist, loose, fine   -     work for all samples drilling with 3-15/16" -
-					grained, no HCl reaction, lighter color with depth, tricone bit
I -					5-10% nonplastic fines, some fines may be organics,   silica sand
					Silica sailu
_					11
-					<b>1  </b>
-					
-					
5	5.0				
35.7					Poorly Graded Sand With Sand (SP-SM)
1 -		1.5	SS-2	4-4-3	5.0-6.5' - moderate yellowish brown, (10YR 5/4), wet, loose, fine grained, no HCl reaction, 5% nonplastic
-	6.5			(7)	fines, trace organics, silica sand
-	6.5				- 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.
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-					<b>- 1</b>
-					- I
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10	10.0				
30.7					Silty Sand (SM)  Material in shoe was more fines with higher
-		1.2	SS-3	6-13-14	10.0-11.2' - light olive gray, (5Y 6/1), wet, medium dense, fine grained, no HCl reaction, 25-30% low to
-	11.5			(27)	nonplastic fines, silica sand
-	11.5				-
_					
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					] ]
1 -					]
I -					<b>1  </b>
1 -					
-					
15	15.0				Interded de d'Oltre Consta And Consta Class (OM CI)
25.7				E 14.10	Interbedded Silty Sands And Sandy Clay (SM-CL)  15.0-15.3' - white to medium light gray to greenish
		0.7	SS-4	5-14-16 (30)	gray, (N9 to N7 to 5G 6/1), wet, medium dense, fine
I -	16.5			(50)	grained, moderate to strong HCl reaction, low to
-	10.5				nonplastic fines in silty sands, medium to high plastic
-					fines in sandy clay, beds 1/4" thick, (2) 1"-2"   _
1 -					carbonate material
I _					Silt (ML)
1 -					15.3-15.5' - yellowish gray, (5Y 6/1), wet, hard to stiff,
I -					low plasticity, moderate HCl reaction, carbonate material
-					Limestone Fragments
-					15.5-15.7' - moderate to strong HCl reaction, mottled
20					appearance
1					
1	l	l	ı		<b>   </b>



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-23	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.7 N, 458210.1 E (NAD83)

ELEVATION: 40.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240, mud rotary, cathead, AWJ/NWJ rods, 3-15/16" tri-cone bit ORIENTATION : Vertical

						tary, carriedo, AVVJ/NVVJ To			ONIENTATION : Vertical
WATER	LEVELS	: 2.3 ft b	3s on 4/18		START : 4/11/2007		LOGGER	{∶J. ; 	Schaeffer, D. Roraback  COMMENTS
≥□⊋ l	041:5: =		1 (0)	STANDARD PENETRATION		SOIL DESCRIPTION		)G	COIVIIVIEN 15
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBO	I COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
ACE		RECOVE	RY (ft)			E CONTENT, RELATIVE D		S S	DRILLING FLUID LOSS, TESTS, AND
FR			#TYPE	6"-6"-6"	CONSISTEN	ICY, SOIL STRUCTURE, I	MINERALOGY	ΥME	INSTRUMENTATION
<u> </u>	00.0			(N)	Silt With Sand	J /MI \		S	
20.7	20.0			14-41-35	20.0-20.7' - yel	llowish gray, (5Y 8/1), we	et, hard, low	4	_
_		0.7	SS-5	(76)	\ plasticity, mild	to moderate HCI reactio	n, 15-20% /	1	_
	21.5			, í	\sand size parti	icles, carbonate material	S/		
							·	1	
-							-	1	_
-							-	1	-
-							-	1	-
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-							-	┨	-
25 <u> </u>	25.0				Oile Miste Occard	1 /841 \		Ь.,	
15.7				27-40-50/5	Silt With Sand 25.0-26.0' - gra	ayish orange, (10YR 7/4)	. wet. hard.	Ш	_
_		1.0	SS-6	(90/11)	nonplastic, mile	d to moderate HCI reacti	on, 26% fine to	Ш	_
	26.4				\medium sand :	size material, carbonate	materials /		
							- -	1	
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30 <u> </u>	30.0				Oile Miss. O	1 /841 \		<b>.</b>	Duillanda Danaando 001 051 duilla laand laad sad
10.7				10-19-22	Silt With Sand 30.0-31.0' - Sa	ame as 25.0-26.0'		Ш	Driller's Remark: 20'-35' drills hard but not rock, just fairly dense -
_		1.0	SS-7	(41)				Ш	_
	31.5			, ,			_		
							-		_
-							-	1	
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35	35.0	0.1	00 0	E0/4	D Limester -			$oxed{L}$	Duillanta Damantu Daak wisses see fellings's
5.7	35.3	U.1	SS-8	50/4 (50/4")	Limestone Fra 35.0-35.1' - mo	<b>agments</b> oderate yellowish brown,	(10YR 5/4)		Driller's Remark: Rock pieces are falling into hole at approximately 12-13', can't get bit
				(00, 1)	fragments up t	to 1"x1/4", very poor reco	very		back in hole; Installed 17' of 6" casing.
									Driller's Remark: 35'-35.5' is very hard Driller's Remark: 35.5'-40.0' drills similar to
							- -	1	20-35'
							-	1	1
-							-	1	-
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40									



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	B-23	SHEET	3	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.7 N, 458210.1 E (NAD83)

ELEVATION: 40.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240, mud rotary, cathead, AWJ/NWJ rods, 3-15/16" tri-cone bit ORIENTATION : Vertical

WATER LEVELS: 2.3 ft bgs on 4/18/07 START: 4/11/2007 END: 4/19/2007 LOGGE									Schaeffer, D. Roraback	_
WATER	LEVELS	. 2.3 11 00	JS 011 4/ 10		STANT . 4/11/2007	SOIL DESCRIPTION	LOGGER		COMMENTS	٦
1000円	SAMPLE	INTERVA	I (ft)	STANDARD PENETRATION		30.2.2.2.301 110.14		SYMBOLIC LOG	33	ᅱ
SELC SELC ION (	OAWII LL	RECOVE		TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBOL	, COLOR,	101	DEPTH OF CASING, DRILLING RATE,	١
TH E		NECOVE		011 011 011		E CONTENT, RELATIVE DE NCY, SOIL STRUCTURE, MII		/BO	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	١
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONGIGILIA	VOT, GOIL OTTIOGTOTIL, IVIII	TVET I TEOCH	SYN	INOTHONEINTATION	1
0.7	40.0	0.7	00.0	44-50/6	Sandy Silt (ML	L)	10\/D 5/4\	Ш		٦
-	41.0	0.7	SS-9	(94/12")	40.0-40.7 - mc	oderate yellowish brown, ( plasticity, mild to moderate	10YR 5/4),	Ш		1
-					reaction, 25-30	0% sand-sized particles to	1/8",	1		1
-					carbonate mate	terials		1		1
-							-	1		1
-							-	1		1
_							-	1		1
-							-	1		1
_							-	1		1
45	45.0						-	1		1
-4.3	10.0		00.40	42-50/5	Silt With Sand	d (ML)		Ш	Driller's Remark: Chatter on and off from	┪
-	45.9	0.9	SS-10	(92/11")		ame as 40.0-40.7' except 2 rticles and streaks; trace g		1111	approximately 40' on, layers with chatter are thin, only a few inches thick	1
_					ti doo bidon pai	. Horoo and on oako, iraoo g	-	1	timi, only a few mones allow	1
_							-	1		1
								1		1
								1		1
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-							-	1		1
50	50.0						-	1		1
-9.3	50.0 50.2	0.1	SS-11	50/2.5	Limestone Fra		D 0/0) 11.1.		1	٦
-				(50/2.5")	\ 50.0-50.05' - pa	pale yellowish brown, (10YI reaction, fragments to 1/2	R 6/2), mild to / - ", poor	1		1
					recovery			1		1
							-	1		1
							-	1		1
							-	1		1
										]
								1		1
							-	1		1
55	55.0						-	1		1
-14.3	55.4	0.4	SS-12	50/5 (50/5")	Silt With Sand	d (ML)	10VD 5/4\	Ш		
				(50/5)	\ wet, hard, nong	oderate yellowish brown, ( plastic, mild to moderate H	ICI reaction,	1		1
					\10-15% sand-s	sized particles to 1/16", ca	rbonate / -	1		1
					materials, trace	e black organic lenses		]		1
1 7							-	1		1
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-23	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.7 N, 458210.1 E (NAD83)

ELEVATION: 40.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240, mud rotary, cathead, AWJ/NWJ rods, 3-15/16" tri-cone bit ORIENTATION : Vertical

						END 4/10/2007			ONIENTATION : VEILICAI
WATER	LEVELS	: 2.3 ft bg	gs on 4/18	B/07 S	START : 4/11/2007	END : 4/19/2007	LOGGE	R : J. <b>T</b>	Schaeffer, D. Roraback  COMMENTS
≥Q⊋ l	041:5:		1 (0)	STANDARD PENETRATION		SOIL DESCRIPTION		SG	COIVIIVIEN 15
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	. ,	TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBOL,	COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
A A C E		RECOVE	ERY (ft)		MOISTURE	E CONTENT, RELATIVE DEN	ISITY OR	30L	DRILLING FLUID LOSS, TESTS, AND
EV, ET			#TYPE	6"-6"-6"	CONSISTEN	ICY, SOIL STRUCTURE, MIN	IERALOGY	₹	INSTRUMENTATION
-19.3	60.0	0.0	SS-13	(N) 50/2	Limeetene Ere	agments With Silt And Sar	a d	S	More chatter from 60'-65'
-19.5	60.0 60.2	0.0	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	(50/2")	60.0-60.2' - lim	nestone fragments, silt and	sand-sized	4	Wore challer from 60 -65
_					\particles, poor			1	_
l _								_	_
_								_	
								1	
								1	
_									
-									-
65 65	65.0							1	-
-24.3	65.0			50.50	Silt (ML)			╫	Driller's Remark: 65.0'-70.0' drilled similar to
-		0.9	SS-14	50-50 (100/12")	65.0-65.9' - mo	oderate yellowish brown, (1	0YR 5/4),	$\  \ $	60.0'-65.0', more rock chips in cuttings –
-	66.0			(100/12)	moist to wet, h	nard, nonplastic to low plast trong HCl reaction, 5-10% f	icity, ine sand	+ -	-
-					size particles,	carbonate materials		-	-
_								-	_
_								_	_
_									_
									_
								1	Driller's Remark: Bouncing on SPT, will
70	70.0								switch to rock coring at 70.0'
-29.3	70.1	0.0	\SS-15	50/1	Limestone Fra		to maderate 7		Finish soil drilling at 17:00 on 4/11/07; setting
-				(50/1")	HCl reaction, p	fragments to 1/2x1/8", mild poor recovery	to moderate	1	HW casing to 70' _ End day at 18:00 on 4/11/07, set 35.0' of HW
-					Begin Rock Co	oring at 70.0 ft bgs		-	casing
-					See the next sl	heet for the rock core log		-	Start at 8:00 on 4/12/07, set remainder of casing and clean out hole
-								-	Cannot take water levels due to tooling in
-								-	hole
_								-	Finish setting casing to 70', clean and flush hole at 11:00 on 4/12/07
_								1	_
_								1	_
_								_	
75									
-34.3							_	1	
-									_
-									-
-								1	-
-								1	-
-								1	-
-								1	-
-								-	-
-								-	-
-								1	_
80							_	1	



FRACTURES PER FOOT

NR

3

3

3

1

NR

4

3

NR

3

1

5

NR

2

2

5

2

undulating

RQD(%)

WATER LEVELS: 2.3 ft bgs on 4/18/07

CORE RUN, LENGTH, AND RECOVERY (%)

70.0 R1-NQ 70.5 n s #

0%

R2-NQ

5 ft 65 0

94%

R3-NC

5 ft

62%

R4-NQ

5 ft

90%

R5-NQ

5 ft 48

100%

52 >10

23 4

DEPTH BELOW SURFACE AND ELEVATION (#)

75

-34.3

80

-39.3

85

90

44.3

85.5

80.5

75.5

PROJECT NUMBER:	BORING NUMBER:					
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#### ROCK CORE LOG

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.7 N, 458210.1 E (NAD83)

START: 4/11/2007

**DESCRIPTION** 

DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND

THICKNESS, SURFACE STAINING, AND TIGHTNESS

70.7, 70.85, 71.4, 71.6, 72.0' - Fractures (5),

73.9, 74.0' - Fractures (2), horizontal, rough, undulating, tight, join a vertical rough

74.4, 74.6' - Fractures (2), horizontal, rough,

undulating, two horizontal fractures bound a

75.5-75.6' - Fracture zone, subangular 3/4" to

75.6' - Fracture, termination of fracture zone

76.2' - Fracture, 70 deg, rough, undulating,

76.4' - Fracture, rough, undulating, 10 deg and 45 deg fractures terminate above 70 deg fracture, and 76 deg before fracture, appears

weathered with cavities 76.6' - Fracture, 70 deg, rough, undulating,

77.1, 77.2' - Fractures (2), horizontal, rough, undulating, open, friable, voids decrease with

77.8' - Fracture, horizontal, rough, stepped

78.4' - Fracture, horizontal, rough, undulating,

77.8-77.9' - Fracture zone, rock crush

78.5' - Fracture, 15 deg, rough, planar

81.8-81.95' - Fracture, vertical, rough, undulating, bonded by horizontal to 10 deg

82.6' - Fracture, 70 deg, rough, undulating,

to a 10 deg rough stepped fracture at 83.0'

83.4' - Fracture, 60 deg, rough, undulating,

84.2' - Fracture, 80 deg, rough, undulating,

undulating, leading into fracture zone with

85.5' - Fracture, 30 deg, smooth, planar 86.2' - Fracture, horizontal, rough, stepped,

fracture terminates underlying vertical

82.8-83.0' - Fracture zone, rock crush leading

leading to underlying fracture zone

84.7' - Fracture, 70-90 deg, rough,

81.1' - Fracture, horizontal, with

rough, undulating fracture

with fragmentation, friable

with fragmentation, friable

missing side of core, fracture terminated

0-10 deg, rough, undulating, tight to open

with some fragmenting at fractures

72.35' - Fracture, horizontal, rough,

72.95' - Mechanical break

undulating fracture at 73.95'

vertical fracture at 74.5'

at a stepped 30 deg face

above horizontal fracture

1" fragments

0.4' long cleave

depth

open

fragmentation

organics

fracture

DISCONTINUITIES

ELEVATION: 40.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

END: 4/19/2007

9

 $\underline{\circ}$ 

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing

ORIENTATION : Vertical LOGGER: J. Schaeffer, D. Roraback LITHOLOGY COMMENTS ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS No Recovery 70.0-70.5' R1: 1 minute Limestone 70.5-75.2' - moderate yellowish brown, (10YR 5/4), mild to moderate HCI reaction, medium strong to strong (R3 to R4), small (up to 1/16") voids cover 30% of surface, many 1/4" to 1/2" cavities some with fossil casts, and a 1" elongated cavity at 92.5', small voids decrease to <5% at 72.5-73.0', trace organic fossil infills and increased fossil molds and casts at 73.0-73.9', extremely weak (R1) rock at 94.0-94.6' R2: 13 minutes No Recovery 75.2-75.5' Limestone 75.5-78.6' - Same as 70.5-75.2' except medium strong (R3), small (up to 1/16") voids cover 30% of surface at 75.5-77.2', increased cavities up to 1/4" (elongated) at 76.4-77.2', very weak (R1) between fractures at 77.1' and 77.2', weak (R2) at 77.2-78.6' No Recovery 78.6-80.5' R3: 14 minutes Limestone Fractures tend to occur at 80.5-85.0' - moderate yellowish weaker (R2) sections that brown to dark yellowish orange, are friable (10YR 5/4 to 10YR 6/6), fine grained, moderate HCI reaction, medium strong to weak (R3 to R2), fossiliferous with 25% small voids and several fossil cavities (up to 1" long), trace 1/4" organic fragments and several organic laminations, weaker with depth R4: 12 minutes No Recovery 85.0-85.5' Limestone 85.5-90.5' - Same as 80.5-85.0' except weak to medium strong (R2 to R3), fossiliferous voids cover 30% of surface (10% minimum, 40% maximum), occasional fine laminations

SC-1 collected at 89.3-

90.5'



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-23	SHEET	6	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.7 N, 458210.1 E (NAD83)

ELEVATION: 40.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing

				MONTH OF THE PROPERTY AND THE PROPERTY A			ORIENTATION . VEILICAI
WATER	LEVELS : 2.3	πbg	s on 4	/18/07 START : 4/11/2007 END : 4/	19/200	D7 LOGGER : J. Schaeffer, D. Rorat LITHOLOGY	COMMENTS
<b>₹9</b> €	CORE RUN, LENGTH, AND RECOVERY (%)			•	8	LITHOLOGY	COIVIIVIEIVIS
DEPTH BELOW SURFACE AND ELEVATION (ft)	ZAZ ZZZ	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
AACE	JA F.E	(%) 🛭	120	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
F 두 듯	NSS	οD	SAC ER F	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	SHR	ď	H H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	2.10. 0, 120. 11202.10, 2.10.
-49.3	90.5		0	86.7' - Fracture, 70 deg and vertical, rough,	Ш		R5: 14 minutes
-	00.0			undulating, tight to open, 5/16" relief, extends 86.2-87.4"	Н	Limestone	Based on overlying and
-	1		3	87.15' - Fracture, 40 deg, rough, undulating,		90.5-91.7' - Same as 85.5-90.5'	underlying rock in the rock -
_				extends through half core joining vertical	Н	except moderate yellowish brown, (10YR 5/4), medium strong (R3),	crush zone; picked 91.7' as _ contact
l _			>10	fracture		- fossiliferous, many cavities up to 1/2"	End of core from R6-NQ -
				88.0-88.7' - Fracture zone, several horizontal	Н	91.7-92.1' - light olive gray, (5Y 5/2),	matches top of R7-NQ
_	R6-NQ			fractures with a 70 deg fracture crossing all horizontal fractures, clean large (2"-3")	Н	fine grained, moderate to strong HCI	core, therefore core loss
-	5 ft	28		fragments, bounded by 30 deg fractures	ш	- reaction, strong (R4), increasing	interpreted to be from –
-	50%		NR	rough to undulating on top and bottom	Н	voids with depth from 5-15%, elongated cavities near 94.8', large	middle of core run  Core loss assumed to be
l _	]			89.0, 89.25' - Fractures (2), horizontal, rough,		- 1"x1"x1/2" cavity at 95.1'	from 92.1-94.6'
				undulating 91.0' - Fracture, 70 deg, rough, undulating, 4"	Н	No Recovery 92.1-94.6'	
95				long, weathered edges, tight	Ш	Limestone	R6: 14 minutes
-54.3	1,55		2	91.4-92.1' - Fracture zone	曰	94.6-95.5' - Same as 91.7-92.1'	-
1 -	95.5			94.8' - Fracture, 80 deg, rough, undulating,	╀┤	95.5-99.3' - Same as 94.6-95.5'	-
-			0	tight, 4" long 95.5' - Fracture, 45 deg, rough, planar, tight	ш	<ul><li>except voids increasing to 20-25%,</li></ul>	I -
l _				to healed, joints with R7 core	Н	weak (R2) at 97.9-98.85'	
				•			
_	1		0	-	ш	=	1
-	R7-NQ			-	tri	=	-
_	5 ft	42	>10	97.7, 97.9' - Fractures (2), 20 deg, rough,	H	_	-
l _	92%			undulating, open, fragmented beneath 97.9' 98.25, 98.55, 98.65' - Fractures (3), 10 deg,	Н	_	
			۰	somewhat fragmented			
	1		8	98.4' - Fracture, vertical, rough, undulating,	Н		1
400	1		8	open and somewhat fragmented, bounded by	Ħ	<ul> <li>99.3-100.1' - yellowish gray, (5Y 7/2), moderate HCl reaction, strong (R4),</li> </ul>	R7: 14 minutes
100_ -59.3	1			10 deg fractures at 98.25' and 98.55' 99.1' - Fracture or mechanical break, 10 deg,	ш	voids decreasing to 5-10%, transition	I —
-	100.5		NR	rough, undulating, tight to healed	H	from above is irregular with infilling of	\M-4   -+00
_	]		5	99.3' - Fracture, horizontal, rough, undulating,		cavities, 1/2"x3/4" deep spiral fossil	Water level at 2.3 below ground surface
			5	open at contact	Н	at 99.5' - <b>No Recovery 100.1-100.5'</b>	ground surface
-	1			99.5' - Fracture, vertical, rough, undulating, bounded at 99.3' and 99.75'	ш	Limestone	1
-	-		2	99.75-100.1' - Fracture zone, angular block	Н	100.5-104.0' - light olive gray, (5Y	1
1 -	D0 NO			with horizontal and vertical breaks 1"-2" in	口	5/2), fine grained, moderate HCI	-
1 -	R8-NQ 5 ft	52	1	size	${f H}$	reaction, strong (R4), 1/16" voids varying from 5-30%, few 1/2"	1
1	70%			101.15' - Fracture, rough, undulating to planar, open	Ы	elongated fossils, few cavities,	SC-2 collected at 103.25- 103.95' -
1 -			1	101.4-101.5' - Fracture zone, bounded by <5	П	mostly shallow and <1/2", trace	100.80
I -	1			deg, rough, undulating, very open fracture	Н	organics laminations and inclusions	1
			NR	101.8, 102.1' - Fractures (2), 50 deg, rough,	ш	No Recovery 104.0-105.5'	R8: 20 minutes
105_ -64.3			INE	undulating 103.25' - Mechanical break —	$\vdash \vdash$	<u></u>	
-04.3	105.5			103.25 - Mechanical break	H	- -	
			<b>-10</b>	105.5-106.2' - Fracture zone, angular rock	Ш	<b>Limestone</b> - 105.5-108.0' - Same as 100.5-104.0'	
1 -	]		>10	fragments and nearly fractures at 106.0' 106.2' - Fracture, 10 deg, rough, stepped	Ш	except light olive gray to moderate	1
-				100.2 - Fracture, 10 deg, rough, stepped	$\square$	olive brown, (5Y 5/2 to 5Y 4/4),	-
-			0		₽	<ul> <li>10-20% voids, fragmented at </li> </ul>	-
-					ш	_ 105.5-106.2'	-
1 _	R9-NQ 5 ft	33	0	407 Ol Machanical bral-	Н	_	]
	50%	55		107.9' - Mechanical break		No Recovery 108.0-110.5'	]
1 -					$\mathbb{H}$		1
1 -			NR	-		-	
1 -			INIX	<u>-</u>	$\square$	_	R9: 19 minutes
110					H	_	T.C. TO HIMICEO
1							



PROJECT NUMBER:	BORING NUMBER:	
338884.FL	B-23	SHEET 7 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.7 N, 458210.1 E (NAD83)

ELEVATION: 40.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.3	3 ft ba	s on 4	/18/07 START : 4/11/2007 END : 4/	19/20	D7 LOGGER : J. Schaeffer, D. Rorat	pack
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-69.3	110.5				П		
-			0	-		Limestone 110.5-115.5' - moderate yellowish brown, (10YR 5/4), moderate HCl	-
-			8	111.7, 111.9' - Fractures (2), 50 deg, rough, undulating, tight 112.25' - Fracture zone, horizontal, stepped,	Ħ	reaction, very weak to strong (R1 to R4), small (1/16") voids 10-20%, minimal cavities, strong (R4) rock at	]
-	R10-NQ 5 ft 100%	53	8	1"-2" angular fragments  113.1' - Fractures, vertical, rough, moderately open, bounded by similar horizontal fractures		110.5-113.0', medium strong (R3) rock 113.0-113.5', intermingled zones of very weak and weak (R1	_
-			3	at 113.0' and 113.25'  113.5' - Fracture, vertical, rough, undulating, open, bounded at 113.1' by horizontal		and R2) rock at 113.5-115.2',  medium strong to strong (R3 to R4) at 115.1-155.5', intermittent zones of solid core and rock fragments	
115_ -74.3 -	115.5		>10	fracture — 114.25, 114.6' - Fractures (2), 40 deg, rough, undulating, between fractures are columnar		112.25-115.5' 115.5-117.5' - Same as 110.5-115.5'	R10: 17 minutes —
-			2	vertical fragments and fractures that are rough, undulating, tight to open 115.1-115.5' - Fracture zone, angular,		except moderate yellowish brown, (10YR 5/4), medium strong to strong (R3 to R4), with intermittent core and	Sand on outside of core from 115.5'-116.0', chatter -
-	R11-NQ		>10	columnar 115.5-116.1' - Fracture, vertical, rough, undulating, half core intact, the other half		- fracture zones similar to 112.25-115.5' No Recovery 117.5-120.5'	started about 6-7 minutes _ into run _ -
- - -	5 ft 40%	14	NR	multiple fragments 116.1' - Fracture, horizontal, rough, undulating, open 116.7' - Fracture, horizontal, rough, undulating to stepped, open 116.7-117.5' - Fracture zone, angular 1-3"			-
120 -79.3	120.5			fragments	F	-	R11: 12 minutes  —
-			>10	120.8' - Fracture or bedding plane, horizontal, planer, open, weathered with rounded face		Limestone 120.5-120.8' - Same as 115.5-117.5' except moderate HCI reaction.	-
-	546.110		3 >10	on lower side, less rounded on upper side 121.1-121.5' - Fracture zone, larger angular to subangular 1-2" fragments of both over-and underlying rock		medium strong to strong (R3 to R4),  fine grained, slighty banded with beige and gray  120.8-121.3' - Same as 120.5-120.8'	-
-	R12-NQ 5 ft 46%	8	_10	121.5, 121.75, 122.15' - Fractures (3), horizontal and 10 deg, rough, undulating, open		- except mild HCl reaction, very weak (R1), end of weaker rock in fracture zone	-
- 125_			NR	121.6' - Fracture, 70-90 deg, rough, undulating, small vertical terminated by horizontal fracture and fracture zone 122.15-122.25, 122.5-122.8' - Fracture zone		- No Recovery 122.8-125.5'	R12: 12 minutes
-84. <del>3</del> -	125.5		>10	(2), 1/4" to 1" subangular to rounded fragments - 122.25, 122.5' - Fractures (2), horizontal, rough, stepped		Limestone - 125.5-125.8' - Same as 120.5-122.8'	SC-3 collected at 125.8-
-			2	125.5-125.8' - Fracture zone, rounded 3/4" to 1-1/2" fragments 125.8' - Fracture, horizontal, rough,		except light olive gray to moderate yellowish brown, (5Y 5/2, 10Y 5/4), mild to moderate HCl reaction, very weak to weak (R1 to R2), rounded	126.6'
-	R13-NQ 5 ft 46%	28	2	undulating 126.9' - Fracture, 60 deg, rough, undulating 127.7' - Fracture, horizontal, rough, undulating		3/4" to 1-1/2" spherical fragments - 125.8-126.9' - Same as 125.5-125.8' except very weak to weak (R1 to R2),	
-			NR	-		intact core 126.9-127.8' - Same as 125.5-125.8' except very weak (R1), friable No Recovery 127.8-130.5'	- R13: 19 minutes
130							TVIO. 10 Hillians



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-23	SHEET	8	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.7 N, 458210.1 E (NAD83)

ELEVATION: 40.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing

	LEVELS : 2.3			18/07 START : 4/11/2007 END : 4/		07 LOGGER : J. Schaeffer, D. Roral	pack
				DISCONTINUITIES	Ú	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-89.3	130.5						
-			>10 >10	130.5' - Fracture, horizontal, rough, planar 130.65-131.25' - Fracture zone, subangular 1/2" to 1-1/2" 130.65' - Fracture, horizontal, rough, planar 131.25, 131.35, 131.40, 131.55, 131.65' - Fractures (5), planar fractures along bedding		Limestone  130.5-130.65' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong to strong  (R3 to R4), fine voids cover less than 5% of surface, very abrupt transition	- - - -
- - - 135_ -94.3	R14-NQ 5 ft 36% 135.5	0	NR	planes, open 131.65-132.1' - Fracture zone, angular, broken along horizontal planes and small 1/4" to 3/4" fragments 132.2' - Fracture, horizontal, smooth, planar 132.25' - Fracture, beginning of vertical fracture with strong black to gray staining		to 30% voids at 130.6' followed by a fracture 130.65-131.25' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, very weak to weak (R1 to R2), 10-30% voids, entirely fragmented, 10-30% voids = 131.25-132.3' - Same as 130.5-130.65' except strong (R4),	
_	100.0		>10	135.5-136.25' - Fracture zone, numerous 3/4" to 2" fragments, subangular to subrounded, contains lithology transition at 136.1'	Ħ	<3% voids, horizontal planes visible (<1/16") No Recovery 132.3-135.5'	-
			1	136.7' - Fracture, 10 deg, smooth, stepped, fracture steps at cavity, tight		Limestone 135.5-136.1' - moderate yellowish brown to light olive gray, (10YR 5/4	_
	R15-NQ 5 ft	25	1	137.6' - Fracture, 0-45 deg, stepped, tight	┵	to 5Y 5/2), moderate HCl reaction, weak (R2), 10% 1/16" voids, few 1/4"	_
- - 140	48%	20	NR			elongated cavities  136.1-137.9' - light olive gray to yellowish gray, (5Y 6/1 to 5Y 7/2), fine grained, moderate to strong HCl reaction, grayer transitioning to yellower with depth, 5% fine voids,	- - R15: 22 minutes
-99. <del>3</del> -	140.5		<10	140.5-141.2' - Fracture zone, angular to subangular fragments 1/4" to 1-1/2"		several 1/4" to 1/2" elongated and deep (3/4") cavities. Cavities infilled in places with porous appearance,	Driller's Remark: Water level = 4.79' below ground - surface
_			2	141.2' - Fracture, horizontal, rough, undulating 141.3' - Fracture, 80 deg, smooth, undulating	Ė	moderately HCI reaction  No Recovery 137.9-140.5'  Limestone	Bit clogged, pulled casing, rocks in clay matrix, stopped at 143.0' to check bit (mechanical break)
-	R16-NQ		1	141.5' - Fracture, horizontal, rough,	岸	140.5-141.2' - yellowish gray to - dusky yellow, (5Y 7/2 to 5Y 6/4),	bit (mechanical break)
-	5 ft 50%	10	1 undulating, open 141.7' - Fracture, 70 deg, rough to smooth, undulating, may join with 80 deg fracture at 141.3'	141.7' - Fracture, 70 deg, rough to smooth, undulating, may join with 80 deg fracture at		strong HCl reaction, 1/16" voids over 5% of surface, 1/16" to 1/8" voids over 5% of surface, fracture zone with 1/4" to 1-1/2" fragments at 141.2'	- - -
145_ -104.3	145.5		NR	- -		<ul> <li>141.2-143.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong to strong</li> </ul>	R16: 23 minutes
			2	145.9' - Bedding plane, 10 deg, smooth, planar, open		(R3 to R4), variations of 0-10% fine voids vary over interval     No Recovery 143.0-145.5'     Limestone	-
_			5	146.3' - Fracture, horizontal, planar, open 146.4' - Fracture, 50 deg, planar 146.5' - Fracture, horizontal, undulating, open		145.5-146.5' - Same as 141.2-143.0' 146.5-148.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4),	Retrieved core from barrel when rods pulled (1.5' of core)
-	R17-NQ 5 ft	20	1	146.8, 147.1' - Fractures (2), horizontal, rough, undulating, tight	士	medium strong to strong (R3 to R4), up to 20% 1/16" voids, few 1/4" thin	-
-	50%		NR	rough, undulating, tight 147.2, 147.4, 147.55' - Fractures (3), horizontal, rough, undulating, open		elongated fossils, red iron staining embedded and in fractures  No Recovery 148.0-150.5'	- - R17: 18 minutes
150					$\vdash$		IXTE. TO ITHITULES



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-23	SHEET	9	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.7 N, 458210.1 E (NAD83)

ELEVATION: 40.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 2.3	ft bgs	s on 4	/18/07 START : 4/11/2007 END : 4/	19/20	07 LOGGER : J. Schaeffer, D. Roral	pack
				DISCONTINUITIES		LITHOLOGY	COMMENTS
ELOV SN (ft	N, AND 3Y (%	_	ZES T	DESCRIPTION	CLO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR	COR LENC RECC	RQ	FRA( PER	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMI	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-109.3	150.5	_			Ħ		
-	150.5				l	Bottom of Boring at 150.5 ft bgs on	
_					1	- 4/19/2007	_
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					1		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-23A	SHEET	1	OF	4

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723147.5 N, 458207.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: Mark Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550, S/N 186073, mud rotary, cathead, AWJ rods, 2-7/8" drag bit

					S/N 1000/3, ITIUU TOIAIY, Catrieau, AWJ 100S, 2-7/6 Urag Dit ORIENTAT	
WATER	LEVELS	: 5.0 ft bo	15 VII 0/3		START : 11/28/2007         END : 11/28/2007         LOGGER : D. Whitaker           SOIL DESCRIPTION         COMMENTS	1
종무윤	SAMDIE	INTERVA	I (ft)	STANDARD PENETRATION	Sole Best III 110.1	
ON (	SAMPLE			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	ING RATE,
PAC ATI		RECOVE	_ ` `		MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY DRILLING FLUID LOSS, TE INSTRUMENTATION	
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCT, SOIL STRUCTURE, IMINERALOGY	JIN
42.4	0.0			( )	Topsoil (ML) [31/2] Boring conducted for hamme	r testing
-		1.1	SS-1	1-2-5	0.0-0.45' - grayish brown, (5YR 3/2), very loose, little purposes only; 2-7/8" drag bit organics, 0.3-0.45' wood and roots	-
-	4.5			(7)	Poorly Graded Sand With Organics (SP)	-
-	1.5				┤	-
-					2/1 to 5YR 6/1), moist, loose, very fine to fine grained, no HCl reaction, 30% organic fines, decreasing with	-
-					depth	-
-					-	-
-						-
-						-
					-	-
5 37.4	5.0				Silty Sand (SM)	-
-		0.9	SS-2	5-8-12	5.0-5.9' - moderate yellowish brown, (10YR 5/4), wet,	-
-		0.9	55-2	(20)	medium dense, very fine to fine grained, no HCl reaction, 25% nonplastic fines, slight orange staining	-
-	6.5				at 5.0-5.3', trace organics and black staining.	-
-					-	-
-						-
-						-
-						_
_						_
_					1 1	_
10	10.0				016, 0-14 (010)	_
32.4				2-2-2	Silty Sand (SM) 10.0-10.75' - dark yellowish orange, (10YR 6/6), wet,	_
_		1.1	SS-3	(4)	very loose, very fine to fine grained, no HCl reaction,	_
_	11.5				\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	_
-					\ 10.75-11.1' - moderate yellowish brown, (10YR 5/4),   \ \	_
_					wet, nonplastic, rapid dilatancy, no HCl reaction, 40%	_
_						_
-					] ]	_
_						andan ne -l
-					Driller's Remark: Becomes h	ыниег-госку ат
15	15.0					
27.4				3-7-15	Silt (ML) 15.0-16.0' - dark yellowish orange, (10YR 6/6), wet,	_
_		1.0	SS-4	(22)	very stiff, nonplastic, rapid dilatancy, mild to moderate	
_	16.5				HCl reaction, 5-10% very fine sand sized, carbonate	_
_					] ]	_
_					] ]	_
_					] ]	_
20						



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-23A	SHEET	2	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723147.5 N, 458207.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: Mark Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550, S/N 186073, mud rotary, cathead, AWJ rods, 2-7/8" drag bit

WATER	LEVELS	: 5.0 ft bo	as on 6/30	0/07	START : 11/28/2007 END : 11/28/2007 LOGGER : D. Whitaker
>				STANDARD	SOIL DESCRIPTION g COMMENTS
A NO NO NO NO NO NO NO NO NO NO NO NO NO	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH BE		RECOVE	RY (ft)		MOISTURE CONTENT, RESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
22.4	20.0				Silt (ML)
		1.4	SS-5	12-42-50 (92)	20.0-21.35' - Same as 15.0-16.0' except hard
_	21.5			. ,	<u> </u>
-					-
-					-
-					-
-					1
25	25.0				
17.4				20-20-24	Sandy Silt And Limestone (ML) 25.0-25.9' - yellowish gray and dusky yellow, (5Y 7/2
-		0.9	SS-6	(44)	and 5Y 6/4), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 35% fine to coarse sand sized,
-	26.5				\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
-					30.0'
					]
_					
-					4 1
-					-
30 <u> </u>	30.0				Sandy Silt And Limestone (ML)
-		1.1	SS-7	45-26-33	30.0-31.05' - Same as 25.0-25.9 except dusky yellow, (5Y 6/4), moderate HCl reaction
-	31.5			(59)	(0.1.0.1), modulate 1.0.10001011
_					
-					Driller's Remark: Encountering rock at 33'
-					and chattering
-					1
35	35.0				1
7.4				0.4.2	Silty Sand (SM) 35.0-35.65' - light olive gray, (5Y 2/2), wet, very loose,
_		0.7	SS-8	9-4-2 (6)	fine to coarse grained, moderate HCl reaction, 10% fine to gravel-sized limestone fragments, 20-25%
-	36.5				nonplastic fines, carbonate materials
-					Driller's Remark: Hard at 37'; change to 2-
-					7/8" tricone bit
					1
					]
_					
40					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-23A	SHEET	3	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723147.5 N, 458207.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: Mark Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550, S/N 186073, mud rotary, cathead, AWJ rods, 2-7/8" drag bit

						atrieau, Avv J rous, 2-7/6 ur		_	ORIENTATION : Vertical
WATER	LEVELS	: 5.0 ft bo	gs on 6/30		START : 11/28/2007	END : 11/28/2007	LOGGER	: D.	
200				STANDARD	SC	IL DESCRIPTION		၅၉	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS	00"	00.000.00	0.0	SYMBOLIC LOG	PEDTU OF 040000 FEW 1975 F1-
HSE		RECOVE	ERY (ft)		SOIL NAME, US	CS GROUP SYMBOL, COL TENT, RELATIVE DENSIT	LUR, Y.OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
F A Y			#TYPE	6"-6"-6"	CONSISTENCY, S	OIL STRUCTURE, MINERA	ALOGY	MB	INSTRUMENTATION
SU ELE				(N)				λS	
2.4	40.0	0.0_/	SS-9	50/1.5	No Recovery 40.0-4	0.1'			
_				(50/1.5")			-		_
-							-		Driller's Remark: Medium hard drilling from
-							-		41-62'
I -							_		_
l -							_		_
							_		_
							_		_
-							-		=
45	45.0						-		-
45 -2.6	45.0			10 = :	No Recovery 45.0-4	6.0'		$\vdash$	-
		0.0	SS-10	46-50/5.5 (96/11.5")			_		-
-	46.0			(30/11.3)			_		-
l -							_		_
l _							_		_
_							=		=
-							-		-
-							-		=
-							_		-
50 <u> </u>	50.0			00 50/0 5	_ Limestone Fragmer	nto.		Н	_
-7.0 -	50.8	0.3	SS-11	33-50/3.5 (83/9.5")	\ 50.0-50.25' - light oli	ve gray, (5Y 5/2), mild H(	cı /-		_
_	50.6			(00/0.0 )	\reaction, fine gravel-	sized fragments			_
									_
_							_		_
_							-		<del>-</del>
-							-		-
-							-		-
-							-		-
-							_		_
55	55.0								_
-12.6	55.4	0.0	SS-12	50/5 (50/5")	No Recovery 55.0-5	5.4'			_
				(30/3)					
1 7									]
-							-		7
-							-		-
-							-		-
-							-		-
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							_		
60									



PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	B-23A	SHEET	4	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723147.5 N, 458207.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: Mark Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550, S/N 186073, mud rotary, cathead, AWJ rods, 2-7/8" drag bit

WATER	LEVELS	: 5.0 ft bo	gs on 6/30	0/07 5	START : 11/28/2007 END : 11/28/2007 LOG	GER	: D.	Whitaker
>				STANDARD	SOIL DESCRIPTION		ရွ	COMMENTS
AND (fig.	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISOS CROLIR SYMBOL COLOR		ССО	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
-17.6	60.0	0.0	SS-13	50-50/4	No Recovery 60.0-60.8'			
	60.8	0.0	00 10	(100/10")		$\dashv$		_
l -								_
-						4		-
_						4		Driller's Remark: Hard at 62' Driller's Remark: Soft from 62.5-64.5'
-	_					4		Driller's Remark. Soit from 62.5-64.5
-	_					-		-
-	_					-		-
65	65:9					-		Driller's Remark: Hard from 64.5-66.5'
-22.6	85:4	0.0	SS-14)	50/1	No Recovery 65.0-65.1'			
-				(50/1")		1		_
						]		_
						]		Driller's Remark: Soft from 66.5-67.5'
_						4		-
_	_					4		Driller's Remark: Hard from 67.5-70.0'
-	_					-		-
-						-		-
						-		-
70 <u> </u>	70:9	0.0	SS-15	50/1	No Recovery 70.0-70.1'			Boring completed at 16:55 on 11/28/2007
-	-			(50/1")	Bottom of Boring at 70.1 ft bgs on 11/28/2007	_ {		Water level at 5.0' below ground surface Driller's Remark: 25% loss of circulation
-						1		throughout entire boring
								_
						]		_
_						4		_
_						4		-
-						-		-
	-					-		-
75 <u> </u>	_					$\dashv$		
-						-		-
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-						4		-
-						4		-
80								



PROJECT NUMBER:	BORING NUMBER:

338884.FL B-24 SHEET 1 OF 8

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723356.3 N, 458351.5 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 1.61 ft b	ogs on 6/1	14/07	START : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	. ,	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR  BEFIN OF CASING, DRILLING RATE,  DEFIN OF CASING, DRILLING RATE,  DRILLING FLUID LOSS, TESTS, AND
DEPT SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
40.9	0.0				Silty Sand With Organics (SM)  "Water level is based on Ground Water
		0.4	SS-1	0-4-4 (8)	\[ \sqrt{0.0-0.4'} - grayish brown to dusky brown, (5YR 2/3 to 5Y 2/2), moist to wet, loose, fine sand, 16% fines, \[ - \frac{1111}{2} \] Monitoring at LNP site (FSAR Table 2.4.12.08)"
	1.5			(-)	\12% organic matter
_					Begin drilling with 3-7/8" tri-cone bit at 2.0'
_					
-					
-					
-					
5	5.0				<b>1</b>
35.9					Poorly Graded Sand With Silt (SP-SM) 5.0-5.95' - moderate yellowish brown, (10YR 5/4), wet,
		1.0	SS-2	2-3-4 (7)	│ loose, very fine to fine grained, no HCl reaction, 11% │ │ │ │
_	6.5			. ,	\low plasticity fines, trace roots, trace coarse gravel, \sand is silica
-	-				
-					
-					
-					
-	-				<b>†  </b>
10	10.0				1.1
30.9				4-5-10	Silt (ML) 10.0-11.05' - grayish orange, (10YR 7/4), wet, stiff, wet, stiff, wet, sti
-	_	1.1	SS-3	(15)	nonplastic, rapid dilatancy, moderate HCl reaction, trace fine grained sand, all carbonate derived
-	11.5				trace line grained sand, all carbonate derived
-	_				
-					
-	-				<b>1  </b>
					] [
_					
15 25.9	15.0			47.50/0	Limestone Fragments And Silt (ML)
25.5	15.8	0.6	SS-4	47-50/3 (97/9")	15.0-15.6' - silt is grayish orange, (10YR 7/4), wet,
-					hard, nonplastic, rapid dilatancy, 60% of sample is limestone, pale yellowish brown, (10YR 6/2), fine
-	-				\daggrained sand to coarse grained gravel-sized \daggray - \fragments, moderate HCl reaction -
-	1				-
	]				] [
-					<b>                                   </b>
-					
-					
20_					-
1					



PROJECT NUMBER:

33884.FL

B-24

SHEET 2 OF 8

#### **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723356.3 N, 458351.5 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 1.61 ft l	ogs on 6/	14/07	START : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez
300				STANDARD	SOIL DESCRIPTION g COMMENTS
AND (f)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISCS CROUD SYMPOL COLOR
H BE ACE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
20.9	20.0			( )	Silt With Sand (ML)
-		1.3	SS-5	13-47-18 (65)	21.0-21.25' - grayish orange to moderate yellowish brown, (10YR 7/4 to 10YR 6/2), moist to wet, hard,
-	21.5			(00)	nonplastic, rapid dilatancy, moderate HCl reaction, 5-10% sand-sized grains, 5-10% medium to coarse
					grained material
_					
_					Driller's Remark: Harder drilling at 22.5'
_					<u> </u>
-					-
					-
25 15.9	25.0				Sandy Silt (ML)
-		1.5	SS-6	8-8-6	25.0-26.5' - Same as 20.0-21.25' except 27% fine grained sand, 13% medium to coarse grained sand
-	26.5	1.0		(14)	grained sand, 15% medium to coarse grained sand
-	20.0				
-	1				1
					]
					Driller's Remark: Hard drilling at 28', 20% circulation loss
_					
-					_
30 <u> </u>	30.0 30.2	0.2	SS-7	50/2	Limestone Everyments
10.9		0.2	33-1	(50/2")	Limestone Fragments 30.0-30.15' - light brown, (5YR 5/6), mild to moderate 4" casing set at 30'
-					\HCl reaction, moderately fossiliferous
-	-				<del> </del>
-	-				<u> </u>
-	1				1
-	1				1
-					1
					]
35	35.0				Silty Sand (SM)
5.9				6-10-19	35.0-36.5' - dark yellowish brown, (10YR 4/2), moist to
-	-	1.5	SS-8	(29)	wet, medium dense, fine to coarse grained, mild HCl reaction, 30% nonplastic fines, all carbonate derived
-	36.5				Teaction, 30 % nonplastic lines, all carbonate derived
-	-				1 1
-	1				
-	1				1 1
-	1				1
-	1				1
40	<u> </u>				
1					1



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-24	SHEET	3	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723356.3 N, 458351.5 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 1.61 ft b	ogs on 6/1	14/07	START : 5/15/2007 END : 5/17/2007 LOGGER	R : R	. Gomez				
				STANDARD	SOIL DESCRIPTION	ß	COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	SYMBOLIC LOG	DEDTH OF CASING DRILLING BATE				
H BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR	BOLI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND				
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYM	INSTRUMENTATION				
0.9	40.6	0.0	SS-9	50/3	No Recovery 40.0-40.3'	L					
				(50/3")		]					
_					_		_				
-					-	-	-				
-					-	1	-				
-					-	1	-				
-					-	1	-				
-					<del>-</del>	1	-				
45_	45.0				_	1					
-4.1	45.4	0.4	SS-10	50/5 (50/5")	Silty Sand (SM)	П	Driller's Remark: Hard to soft material from 45-50' (heavy to no grinding)				
-				(00/0)	moist, very dense, fine to coarse grained, mild HCl reaction, 25-30% low plasticity fines, 5% fine grained	1	so (neavy to no grinding)				
-					gravel   -	-	-				
-					-	ł	-				
-					-	1	-				
-					-	1	-				
-						1	<u> </u>				
50	50.0				Live at an a Fire way at And City Cond (OM)		Dellada Danado Madiona adadia a fara 50				
-9.1 -		4-	00.44	39-37-50	Limestone Fragments And Silty Sand (SM) 50.0-51.5' - Same as 45.0-45.6' except dark yellowish		Driller's Remark: Medium grinding from 50-55' -				
-		1.5	SS-11	(87)	brown, (10YR 4/2), 60% limestone fragments, 40% silty sand	-	-				
-	51.5						-				
-					-	1	-				
-						1					
					_						
-					-	-	-				
-	<u>54</u> .8				-	┨	Advanced 4" casing to 55', switch to rock				
55 <u> </u>	34:9	0.0	SS-12)	50/1	No Recovery 55.0-55.1'	H	coring, see rock core log				
-				(50/1")	Begin Rock Coring at 55.0 ft bgs See the next sheet for the rock core log	1	-				
1 -					-	1	-				
-					-	1	_				
] ]											
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PROJECT NUMBER:

33884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723356.3 N, 458351.5 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 1.6	1 ft bo	gs on (	6/14/07 START : 5/15/2007 END : 5/	17/20	007	LOGGER : R. Gomez	
				DISCONTINUITIES			LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE ATIO	E RUI	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	] J		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ENG	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB		AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	55.0	Ω.	ШΔ		S	—		
-14.1	55.0		>10	55.1' - Fracture, horizontal, rough, planar, open	片		Limestone 55.0-57.0' - moderate yellowish	] -
_				55.4-55.6' - Fracture zone, multiple fractures,	世		brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), medium	-
-			0	gravel-sized rock fragments 55.9' - Fracture or mechanical break,	╀		grained, mild to moderate HCl	-
-	D4 110			horizontal, rough, planar, tight		$\downarrow$	reaction, weak (R2), voids (1/16-3/16") over 20-30% of surface,	4
-	R1-HQ 5 ft	45	2	57.0-57.2' - Clay seam, 0.2' thick	$\coprod$	┸╢	moderately fossiliferous (shell	1 4
-	82%			57.9-58.4' - Fracture zone, multiple fractures		╁╢	fragments), black organic lenses	4
_			>10	or.o oo.a Tractare zone, matapie nactures	///		Fat Clay (CH)	
_					Ħ	IL   \	57.0-57.2 - moderate brown, (5YR	1
_			O NR				4/4), high plasticity  Limestone	R1: 11 minutes
60	60.0		INIX	_	$\vdash$	┰	57.2-58.0' - Same as 55.0-57.0'	
-19.1			2	60.3' - Fracture or mechanical break, 60 deg	厂	1\	Fat Clay (CH)	]
l _				60.6' - Fracture, rough, stepped, open		1 \	58.0-58.4 - grayish brown to dusky yellowish brown, (5YR 3/2 to 10YR	
I -			0	1/8-5/16"	H	┨╵	2/2), medium to high plasticity	]
_			0	_	F		<b>Limestone</b> 58.4-59.1' - Same as 55.0-57.0'	
_	R2-HQ 5 ft	33	5	62.1, 62.5, 62.7, 62.8, 63.0, 63.3, 63.4, 63.7,			except cavities (3/16-9/16") over 40%	
_	96%	55	,	64.1, 64.4' - Fractures (10), rough, planar,			of surface No Recovery 59.1-60.0'	
			3			-	Limestone	
			3				60.0-61.2' - Same as 55.0-57.0' except pale yellowish brown, (10YR	
			2				6/2), medium to coarse grained	R2: 12 minutes
65	65.0		NR.		Ь	Ł	61.2-64.8' - pale yellowish brown to dark yellowish brown, (10YR 6/2 to	
-24.1			>10	65.0-66.2' - Fracture zone, rough to smooth, planar, <1/16" silt and/or clay sized infilling	$\mathbf{H}$	-	10YR 4/2), fine to coarse grained,	
			/10	planar, < 1/10 Silt and/or day sized inilling			moderate HCl reaction, very weak (R1), weak rock (R2) at 63.7', 63.8'	
			2	66.25.66.51. Fractures (2) rough standard		1	and 64.0', friable, poorly fossiliferous	
				66.35, 66.5' - Fractures (2), rough, stepped, open 1/8"	$\vdash$		No Recovery 64.8-65.0 Limestone	SC-1 collected at 66.5- 67.25'
	R3-HQ	20	1	67.2' - Fracture, rough, stepped, open			65.0-66.2' - Same as 61.2-64.8'	07.25
	5 ft 94%	38	1	3/16-1/4"	匚		except increase in weak rock (R2), rock chips	1
I -			2		$\vdash$		66.2-69.7' - dark yellowish brown,	1
			2	68.5, 68.7' - Fractures (2), rough, stepped,	$\vdash$		(10YR 4/2), moderate HCl reaction, very weak to weak (R1 to R2), voids	1
			<10	open 1/16-3/16"			(up to 3/16") over 30% of surface,	R3: 9 minutes
70	70.0		NR		片	1	solution cavities (up to 3/4") over 10% of surface, intervals of fine	1
-29.1				70.0-74.0' - Fracture zone, vertical, multiple		┲	grained limestone with no voids or	
_			10	fractures, mostly vertical along weak joints, slight infilling	$\Box$		solution cavities from 69.0-69.7' No Recovery 69.7-70.0'	1
_			40		仜	T	Limestone	1
-			10		$\sqsubseteq$		70.0-72.4' - pale yellowish brown, (10YR 6/2), fine grained, moderate	1
-	R4-HQ				Е	╀	HCI reaction, weak to medium strong	] 1
-	5 ft 76%	0	10	-		1	(R2 to R3), voids (<1/8") over 5-10% of surface, silt-like matrix over 5% of	1 1
-			10		厂	-[\	surface, poorly fossiliferous	1
-			10		片		<b>Fat Clay (CH)</b> 72.4-72.6' - light brown, (5YR 5/6),	1
-			NR	•	片	- □	medium to high plasticity, no HCI	R4: 8 minutes
75	75.0		INE	•	世	╁╵	reaction, with black, friable organics	1
' <u>`</u>	. 5.5			_	T	T		
					1			



PROJECT NUMBER:

338884.FL

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723356.3 N, 458351.5 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 1.6	1 ft bo	gs on 6	6/14/07 START : 5/15/2007 END : 5/	17/200	7 LOGGER : R. Gomez	
≥೧≎	(%			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-34.1 -			0	-		Limestone 72.6-73.8' - moderate yellowish brown, (10YR 5/4), very weak (R1),	-
-	R5-HQ		1	76.6' - Fracture, horizontal, rough, stepped, open 3/16-5/16", fracture along cavity		voids (up to 1/16") over 10-20% of surface, moderately fossiliferous No Recovery 73.8-75.0' Limestone	-
-	5 ft 92%	72	3	77.5-77.8' - Fractures, irregular fractures along solution cavities -		<ul> <li>75.0-79.6' - moderate yellowish brown to dark yellowish brown,</li> <li>(10YR 5/4 to 10YR 4/2), moderate</li> <li>HCI reaction, very weak to weak (R1</li> </ul>	-
-			1	78.6' - Fracture, 60 deg, rough, planar		to R2), voids (up to 1/16") over  30-40% of surface, solution cavities at 76.4-77.3', highly fossiliferous	R5: 7 minutes
80	80.0		NR	79.6' - Fracture, horizontal, rough, stepped, open 1/16-1/8"	Н	No Recovery 79.6-80.0'	
-39. <del>1</del> -			2	80.5, 80.8' - Fractures (2), horizontal, rough, planar, some silt and sand infilling		Limestone  80.0-83.4' - pale yellowish brown to dark yellowish brown, (10YR 6/2 to 10YR 4/2), weak to medium strong	-
- -	R6-HQ 5 ft	37	>10	81.6, 82.0' - Fracture zone, multiple fractures along solution cavities 82.2' - Fracture or mechanical break, vertical		- (R2 to R3), voids (1/16") over 20-30% of surface, solutions cavities (<3/4") over 10-15% of surface	-
_	68%	0,	1	82.4' - Fracture, 3-5 deg, rough, stepped, trace infilling, open 1/8-1/4" 83.1' - Fracture, 15 deg, rough, planar		-	-
-			NR	os. i - Flacture, 15 deg, fough, pianal -		No Recovery 83.4-85.0'	R6: 7 minutes
85	85.0			050050151	Ш	<del>-</del> ,	
-44.1 - -			4	85.0-85.2' - Fracture zone, irregular fractures along solution cavities - 85.5' - Fracture, horizontal, smooth, undulating		Limestone  - 85.0-87.3' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), fine grained, strong HCl	- -
-	R7-HQ		1	86.2' - Fracture, horizontal, smooth, stepped, infilling 87.1, 87.4' - Mechanical break (2), horizontal,	H	reaction, weak (R2), trace voids, trace fossils, 20-30% silt sized matrix material	-
-	5 ft 58%	35	1	rough, planar  87.9' - Fracture, smooth, planar, irregular		- 87.3-87.9' - Same as 85.0-87.3' except extremely weak to very weak (R0 to R1), silty matrix increases to	- Driller's Remark: 90%
-			NR	pieces		40-50% No Recovery 87.9-90.0'	circulation loss at 88' R7: 8 minutes
90	90.0			-	H	-	-
-49.1				90.6' - Fracture, 7-10 deg, rough, planar	円	Limestone	_
_			2	90.9' - Fracture, 0-1 deg, rough, planar	円	<ul> <li>90.0-94.3' - grayish orange, (10YR</li> <li>7/4), medium to coarse grained,</li> </ul>	
_			3	91.7, 91.8, 91.9' - Fractures (3), 2-4 deg, rough, planar		moderate HCl reaction, extremely weak to very weak (R0 to R1), voids (up to 1/8") over 20-30% of surface,	-
-	R8-HQ 5 ft 100%	52	10	92.0-92.2' - Fractures or mechanical break, irregular fractures - 92.4' - Fracture, horizontal, rough, planar,		moderately fossiliferous, silty matrix up to 40-50%	-
_			1	trace infilling 92.7' - Fracture, 40-50 deg, rough, planar, to undulating		_	-
_			10	93.9' - Fracture, 5-10 deg, rough, stepped, <3/16" infilling -	H	_	R8: 7 minutes
95	95.0				Ħ		



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723356.3 N, 458351.5 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 1.6	1 ft bo	gs on (	6/14/07 START : 5/15/2007 END : 5/	17/20	D7 LOGGER : R. Gomez	
> O ::	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		RES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH BE	E RU STH, OVEF	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPT SURF	SORE ENG SECC	ROL	FRAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3YME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-54.1	014			94.3-95.0' - Fracture zone, multiple fractures,	1 0)	Limestone	
_			1	very soft material	H	- 94.3-95.0' - Same as 90.0-94.3'	SC-2 collected at 95.2- 96.4'
-				95.2' - Fracture, horizontal, smooth, planar	Ħ	except strong HCl reaction, silty matrix increases to 60-70%	-
_			2	96.4, 96.85' - Fractures (2), 1 deg, rough,	Ħ	<ul> <li>95.0-100.0' - pale yellowish brown, (10YR 6/2), strong HCl reaction, very</li> </ul>	1
-	R9-HQ			stepped, open 1/8-5/16" 97.2, 97.8, 97.9, 98.0, 98.15, 98.9' -	Ш	weak (R1), voids (up to 1/16") over	1
_	5 ft 100%	78	3	Fractures (6), rough, stepped, open 3/16"	Ш	<ul> <li>10-20% of surface, solution cavities (up to 3/8") over 5-10% of surface,</li> </ul>	1
			_		Ш	moderatelý fossiliferous, 5-10% silty matrix (chalk-like)	1
			3		$\mathbb{H}$	- matrix (chaik-like)	1
			2				R9: 6 minutes
100	100.0			99.6, 99.7' - Fractures (2), horizontal,	Д	<u> </u>	
-59.1 -			10	smooth, planar 100.0-100.35' - Fracture zone, irregular	Щ	100.0-101.4' - grayish orange, (10YR – 7/4), medium to coarse grained,	]
_				pieces	Ш	strong HCl reaction, very weak (R1),	]
_			1	101.0, 101.3' - Fractures (2), 60 deg, rough, planar, tight	Ь	voids (up to 1/16") over 5-10% of surface, poorly to moderately	_
_	D40.110				H	fossiliferous No Recovery 101.4-105.0'	-
_	R10-HQ 5 ft	0			H	- No Recovery 101.4-105.0	-
_	28%		NR		$\perp$	_	-
_	_		INIX		廿	_	-
-					H	-	R10: 4 minutes
405	105.0				Ш	-	-
105 -64.1	105.0			_	₩	Limestone	-
_			0		Н	<ul> <li>105.0-108.5' - Same as 100.0-101.4'</li> <li>except pale yellowish brown, (10YR</li> </ul>	-
-					ш	6/2)	1
_			1	106.75, 107.2' - Fractures (2), horizontal,	ш	-	1
	R11-HQ	52		smooth, planar, tight	Ш		1
	5 ft 100%	52	4	107.4, 107.7, 107.9' - Fractures (3), horizontal, rough, planar, open			]
			10	108.3-108.7' - Fracture zone, irregular breaks	Ш		]
_			.0	along weak fractures	Ы	108.5-110.0' - pale yellowish brown, - (10YR 6/2), strong HCl reaction,	<u></u>
_			3	109.3, 109.5, 109.9' - Fractures (3), rough,	H	extremely weak (R0), poorly	R11: 5 minutes
110 -69.1	110.0			stepped, open 1/8-3/16"	F	fossiliferous, no voids	_
-08.1			4	110.1, 110.2, 110.3' - Fractures (3), smooth, breaks along smooth fractures	H	Limestone  – 110.0-113.9' - grayish orange to pale	-
-				110.8' - Fracture, rough, undulating	H	yellowish brown, (10YR 7/4 to 10YR 6/2), strong HCl reaction, very weak	-
-			4	111.1, 111.6' - Fractures (2), rough, planar	世	<ul> <li>(R1), voids (up to 3/16") over 30-40%</li> </ul>	-
-	R12-HQ			111.9, 111.98' - Fractures (2), 5 deg, smooth,	世	of surface, trace solution cavities (up to 3/8"), 10-20% silty and sandy	-
-	5 ft	23	>10	planar 112.1-112.6' - Fracture zone, multiple	Ш	<ul><li>sized matrix</li></ul>	-
-	78%			irregular breaks, some gravel sized rock	H	_	
-			>10	fragments 113.0-113.9' - Fracture zone, multiple	囯	-	
-			ND	irregular breaks along weak fractures	Ш	No Recovery 113.9-115.0'	R12: 4 minutes
115	115.0		NR		Ш	-	1



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723356.3 N, 458351.5 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 1.6	1 ft b	gs on (	6/14/07 START : 5/15/2007 END : 5/	17/20	77 LOGGER : R. Gomez	
<b>₹</b> □₽	(%)			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B	E RU STH, OVE	%) (	ĮŠ.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR!	COR	R Q D (%)	-RA(	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-74.1		_		115.3' - Fracture, horizontal, rough, planar		Limestone	
-			1		+	<ul> <li>115.0-120.0' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR</li> </ul>	SC-3 collected at 115.3- 116.15'
-				·	Ħ	6/2), strong HCl reaction, very weak	-
-			2	116.25' - Fracture, rough, stepped, open 1/16-1/8"	Ħ	<ul> <li>(R1), voids over 20-30% of surface, solution cavities (9/16") over 15-20%</li> </ul>	-
-	R13-HQ			116.45' - Fracture, rough, planar	Ш	of surface from 116.5-118.0', silty	-
-	5 ft 100%	62	1	117.7' - Fracture, smooth, undulating	Ш	<ul> <li>laminations (pale yellowish brown) with no voids/cavities at 118.7' and</li> </ul>	-
_	10070			118.1' - Fracture, smooth, undufating	Ш	118.9'	-
-			6	open 1/16"	ш	-	1
_				118.6' - Fracture, 60 deg, rough, undulating 118.7-118.9' - Fracture zone, regular breaks	ш	=	R13: 7 minutes
120	120.0		2	along weak fractures	Ш	=	1
-79.1				119.2, 119.4' - Fractures (2), irregular breaks — 120.2, 120.3, 120.5, 120.8' - Fractures,	$\mathbb{H}$	120.0-124.3' - grayish orange to pale	
-			4	smooth, stepped, open 1/8-3/16"	Н	<ul> <li>yellowish brown, (10YR 7/4 to 10YR 6/2), strong HCl reaction, very weak</li> </ul>	1
					H	to weak (R1 to R2), voids (up to	1
			0		Ш	<ul> <li>1/16") over 20-25% of surface,</li> <li>10-15% silty matrix, silty laminations</li> </ul>	1
	R14-HQ		_	122.1, 122.2, 122.6, 122.95' - Fractures (4),	Н	at 123.5-123.6', fine grained	-
	5 ft 86%	58	4	horizontal, rough, stepped	Ш	<ul> <li>carbonate laminations (very pale orange [10YR 8/2], weak to medium</li> </ul>	_
				123.1, 128.2, 123.35, 123.5' - Fractures (4),	Ш	strong [R2 to R3]) at 123.8' and 123.9'	
	-			0-1 deg, smooth, planar		_ 123.9	
			0			- - No Recovery 124.3-125.0'	R14: 6 minutes
125	125.0		NR	<u>_</u>	Н		
-84.1			2	125.1' - Fracture, rough, undulating	F	Limestone - 125.0-130.0' - pale yellowish brown,	
_			0 12	125.5' - Fracture, 2 deg, rough, planar	H	(10YR 6/2), moderate to strong HCI	
_					H	reaction, very weak to weak (R1 to R2), voids (up to 1/16") over 15-20%	
_				126.6, 127.7' - Mechanical break (2)	Ш	of surface, solution cavities (up to	
_	R15-HQ 5 ft	70	0		₽	3/4") over 20-30% of surface at - 125.0-126.7', moderately	
_	100%				Щ	fossiliferous, fine grained at 128.8-129.5', 15-20% silty matrix	-
_			5	128.2, 128.3, 128.4, 128.6, 128.8, 129.0' -	ш	- 120.0-129.5 , 15-20 % Silty Hatrix	_
_				Fractures (6), smooth, planar, breaks along weak fractures	Ш	-	R15: 6 minutes
-			2	129.1, 129.3' - Fractures (2), 0-2 deg, rough,	丗	-	- 1713. U IIIIIIIules
130 <u> </u>	130.0			planar —	H	 130.0-132.5' - moderate yellowish	-
-			4		Ħ	brown, (10YR 5/4), mild to moderate	-
-				130.7, 130.8, 130.9, 130.95' - Fractures (4), smooth, planar, breaks along weak fractures	H	HCl reaction, very weak (R1), solution cavities (up to 9/16") over	-
-			1	131.3' - Fracture, rough, stepped, open	世	<ul> <li>5-10% of surface, moderately</li> </ul>	-
-	R16-HQ			1/8-3/16"	Ш	_ fossiliferous	
-	5 ft	70	0	132.2, 132.4, 132.5, 134.6' - Mechanical break (4), irregular breaks	$oldsymbol{arphi}$	132.5-134.6' - very pale orange to	
-	92%				円	<ul> <li>pale yellowish brown, (10YR 8/2 to</li> </ul>	-
-	-		0		世	_ 10YR 6/2), fine grained, strong to moderate HCl reaction, medium	
-			0		団	<ul> <li>strong to strong (R3 to R4), solution cavities (up to 3/4") over 5% of</li> </ul>	R16: 7 minutes
135	135.0		NR		$\blacksquare$	surface, moderately fossiliferous	
135	133.0						



PROJECT NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723356.3 N, 458351.5 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 1.6	31 ft b	gs on 6	6/14/07 START : 5/15/2007 END : 5	/17/20	007	LOGGER : R. Gomez	
<0 €	(%)			DISCONTINUITIES	၂ ပွ		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	: RU iTH, over	(%) Q	FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	S S S		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT URF LEV	ORE ENG ECC	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	XMB		AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-94.1	Ola	ď	ΗД	THIOMNESS, SOM AGE STAINING, AND HOMMESS	S			
-94.1			4	135.1, 135.4, 135.7, 135.9' - Fractures (4), horizontal, rough, undulating, open, dark			o Recovery 134.5-135.0' mestone	_
_				yellowish brown staining	╨		35.0-136.0' - pale yellowish brown	_
_			10	136.0-136.5' - Fracture zone, some gravel	$\perp$		grayish orange, (10YR 6/2 to 0)YR 7/4), fine grained, moderate	_
				sized rock fragments 136.6' - Fracture zone or mechanical break,	Ш	H	Cl reaction, weak (R2), voids (up to	_
	R17-HQ 5 ft	47	0	60 deg, tight	$\bot$		16") over 10-20% of surface, avities (up to 1-3/16"x3/8") over	_
	88%	47	١	137.2 - Fracture or mechanical break, 40 deg, smooth, planar, tight			5-25% of surface, some fossil	SC-4 collected at 137.75-
			0	137.6' - Fracture or mechanical break, rough,			asts/molds 36.0-136.4' - moderate yellowish	138.6'
			١٠١	planar, tight 138.6, 138.9' - Mechanical break (2), rough,	$\perp$		own, (10YR 5/4), fine grained,	
_			0	stepped, open 3/16-5/16"	世		oderate HCl reaction, very weak	R17: 9 minutes
140	140.0		NR	139.3, 139.8' - Mechanical break (2), rough, planar			R1), voids (up to 3/16") over 30-40% surface, trace cavities (3/8"x3/16"),	_
-99.1	140.0			pianai <u> </u>	┺	mo	oderately fossiliferous	
-			0				36.4-138.6' - pale yellowish brown terlaminated with moderate	_
-					++	− ye	ellowish brown, (10YR 6/2 with	-
-			0		+		OYR 5/4), fine to medium grained, oderate HCl reaction, weak (R2),	-
-	R18-HQ				世	- tra	ace voids (up to 1/16"), trace fossils	-
-	5 ft	93	4	142.3, 142.35, 142.4, 142.5' - Fractures (4),	+	(Ca	asts/molds), laminated 38.6-139.4' - pale yellowish brown,	-
_	100%			horizontal, smooth, planar, breaks along weak fractures	+-	+ (10	0YR 6/2), fine to medium grained,	<del>-</del>
-			0		+		rong HCl reaction, very weak to eak (R1 to R2), trace voids (up to	_
-					++		16"), some fossils	R18: 5 minutes
-			0		$\perp$		o Recovery 139.4-140'	10. 5 minutes
145 <u> </u>	145.0			-	ፗ		mestone 10.0-142.5' - pale yellowish brown	
-104.1			5	145.1, 145.3, 145.4, 145.5, 145.8' - Fractures (5), horizontal, rough, planar, open 3/16"	$\pm$		moderate yellowish brown, (10YR	_
_				(3), Horizontal, rough, planar, open 3/10	+		2 to 10YR 5/4), fine to medium rained, strong HCl reaction, very	_
_			0			we	eak to weak (R1 to R2), voids (up	_
_							1/16") over 5-10% of surface, ace fossils	_
_	R19-HQ 5 ft	l l 67	0		$\perp$	14	12.5-142.8' - moderate yellowish	_
	88%	0,			厂		own, (10YR 5/4), fine to medium rained, mild HCl reaction, very weak	
			0		一	to	weak (R1 to R2), voids (up to	
			"		-		16") over 10-20% of surface, trace ssils	
			0			14	12.8-145.0' - pale yellowish brown,	R19: 5 minutes
150	150.0		NR		$\perp$		OYR 6/2), fine grained, mild to oderate HCl reaction, very weak to	
-109.1							eak (R1 to R2), voids (up to 1/8")	Total depth 150.0'
					1		/er 10% of surface, fossils	
					1		nolds/casts) over 10% of surface 45.0-146.0' - moderate yellowish	
-					1	bro	own, (10YR 5/4), mild HCl reaction,	_
-					1		ery weak (R1), voids (up to 1/8") /er 30-35% of surface, laminated,	=
-					1	- 20	0% silty matrix, friable	-
-					1	- 14 bro	16.0-149.4' - moderate yellowish own to pale yellowish brown,	-
-					1	(10	0YR 5/4 to 10YR 6/2), fine to	-
-					1		edium grained, moderate HCl action, very weak to weak (R1 to	-
-					1	- R2	2), solution cavities (up to 3/4") at	=
						114	17.8-148.2', laminated	



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338884.FL	B-24	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723356.3 N, 458351.5 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER LEVELS: 1.61 ft bgs on 6/14/07			qs on 6	6/14/07 START : 5/15/2007	END : 5/1	7/200					
200	~			DISCONTINUITIES		ני	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		SII	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE: COLOR:	OLZE AND DEDENIES CASSISTE			
밀병	Z X X	(%	FRACTURES PER FOOT		2111500	CIC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND			
YFA -	RE F SOV	) Q ?	ACT R FC	DEPTH, TYPE, ORIENTATION, ROUG PLANARITY, INFILLING MATERIAL	SHNESS, LAND	MBC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD			
SUI	SHR	RQD(%)	FR/ PEF	THICKNESS, SURFACE STAINING, AND	TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.			
							No Recovery 149.4-150.0'				
-					=		Bottom of Boring at 150.0 ft bgs on	-			
-					_		_ 5/17/2007	_			
_					_		-	_			
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-25	SHEET	1	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722845.8 N, 458024.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 240; CME 55 S/N 299205, mud rotary, cathead, AWJ/NWJ rods, 3-15/16" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.3 ft bo	s on 6/30	0/07 S	TART: 4/19/2007 END: 4/23/2007 LOGGER:			ER : D. Roraback							
300				STANDARD	SOIL DESCRIPTION		ق	COMMENTS							
N AND	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,							
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND							
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOG	Y	SYN	INSTRUMENTATION							
42.5	0.0			0.0.4	Topsoil 0-0.2' - roots		17	Limited space in header: 3-15/16" tri-cone bit							
_		1.1	SS-1	2-2-4 (6)	Poorly Graded Sand With Organics (SP)	/ _		Soils logged by D. Roraback and J.							
-	1.5				0.2-1.1' - light gray, (N7), moist, loose, fine grained no HCl reaction, silica sand, trace nonplastic fines,	l, /-		Schaeffer							
-					roots and organics decreasing with depth	/ -		Note: D50 S/N 240 (with cathead) started boring; due to mechanical issues, rig							
-						-	l	swapped to CME-55 S/N 299205 at 60 feetbelow ground surface. Soils drilled with D50.							
-						-	l								
-						-		-							
						_									
5 37.5	5.0				Decade Consider Consider (OD)			_							
37.5			00.0	2-3-4	Poorly Graded Sand (SP) 5.0-6.2' - moderate yellowish brown, (10YR 5/4), w	et, -		_							
-		1.2	SS-2	(7)	loose, very fine to fine grained, no HCl reaction, sil sand, trace nonplastic fines, trace roots/organics.	ica _		-							
-	6.5				(a)			-							
-						-	l	-							
-						-		-							
						_									
-						_		_							
-						-		_							
10 <u> </u>	10.0				Poorly Graded Sand With Silt (SP-SM)		1111	_							
-		1.2	SS-3	4-4-5	10.0-11.2' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, no HCl reaction, sil	ica		-							
-	11.5			(9)	<ul> <li>sand, 5% nonplastic fines, trace very fine sand-size</li> </ul>	ed _	414	-							
					black minerals or organics	/ -		_							
-						_									
-						_		_							
-						-		-							
-						-		-							
15	15.0					-		-							
27.5	10.0				Clayey Sand (SC)										
		1.0	SS-4	6-6-5 (11)	15.0-16.0' - mottled yellowish gray, (5YR 8/1), wet, very fine to fine grained, no HCl reaction, silica sar	nd, _									
_	16.5			. ,	21% medium plastic fines	/ _									
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-25	SHEET	2	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722845.8 N, 458024.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 240; CME 55 S/N 299205, mud rotary, cathead, AWJ/NWJ rods, 3-15/16" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.3 ft b	gs on 6/30	0/07	TART : 4/19/2007 END : 4/23/2007	LOGGER	: D.	Roraback
				STANDARD	SOIL DESCRIPTION		o	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	MPLE INTERVAL (ft)  PENETRATION TEST RESULTS  OUI NAME HOOG OPENID SYMPON OF A				SYMBOLIC LOG		
E E E		RECOVE	ERY (ft)	12011120210	SOIL NAME, USCS GROUP SYMBOL, COLOR MOISTURE CONTENT, RELATIVE DENSITY OF		2	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALO	GY	MB	INSTRUMENTATION
SUI				(N)			SΥ	
22.5	20.0				Clayey Sand (SC)			
_		1.1	SS-5	2-5-5	20.0-21.1' - yèllowish gray, (5YR 8/1), moist, stiff, plasticity, no dilatancy, no HCl reaction, 68% fine	nign –		_
-	21.5			(10)	silica sand		///	-
-	21.5							-
-								-
-								-
_						4		-
-						4		-
_						-		=
<b>l</b> -								_
25	25.0							_
17.5					Silty Sand (SM) 25.0-26.0' - pale yellowish brown, (10YR 6/4), we	_tI		
_		1.0	SS-6	5-5-5 (10)	loose, very fine to fine grained, no HCl reaction, s	silica		
	26.5			(12)	sand, 20% low to medium plasticity fines	/T		
						1		
_						1		_
-						=		_
-						-		-
-						-		-
-								-
l								-
30 <u> </u>	30.0				Clayey Sand (SC)		77	_
-			00 -	3-3-4	30.0-30.7' - pale vellowish brown, (10YR 6/2), we	et, -		-
_		0.7	SS-7	(7)	loose, very fine to fine grained, no HCl reaction, s sand, 25-30% medium to high plastic fines, clay	silica /		-
_	31.5				lenses throughout	/ 4		_
_								_
_								_
_								_
I -						1		
_						1		1
35	35.0					1		7
7.5	00.0				Sandy Silt (ML)		Ш	_
-		1.4	SS-8	22-44-41	35.0-36.4' - light olive gray, (5Y 5/2), wet, very ha	ard,		-
-		'''		(85)	nonplastic to low plasticity, rapid dilatancy, mild to moderate HCl reaction, 20-35% very fine to coars	se -		-
-	36.5				sand-sized particles, carbonate materials	/Ŧ	щ	-
-								-
-						4		-
-						4		-
-						4		_
_								_
_								
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722845.8 N, 458024.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 240; CME 55 S/N 299205, mud rotary, cathead, AWJ/NWJ rods, 3-15/16" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.3 ft bo	gs on 6/30	0/07	START : 4/19/2007 END : 4/23/2007	LOGGER	: D.	Roraback
					SOIL DESCRIPTION		(J	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,			DEDTIL OF CACING POLICE DATE
H BE ACE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY (	OR	30LI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EVEN THE			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALO	OGY	SYMBOLIC LOG	INSTRUMENTATION
2.5	40.0				Sandy Silt (ML)		П	Driller's Remark: Hitting hard material
-		1.0	SS-9	17-47-43 (90)	40.0-41.0' - Same as 35.0-36.4'	-		-
	41.5			(00)				
_						_		_
-	-					_		_
-	-					-		-
-	-					-		-
-						-		-
45_	45.0							-
-2.5	70.0	0.0	SS-10	50/0.5	Slough And Limestone Fragments		I	Driller's Remark: 45.5-46' softer
-				(50/0.5")	45.0-45.05' - very poor recovery			_
_								_
_						_		_
-	-					_		_
-						-		-
-	-					-		-
50 50	49.9					4		-
-7.5		0.0	\SS-11	50/0.5 (50/0.5")	Slough And Limestone Fragments 50.0-50.05' - Same as 45.0-45.05'	7	_	
				(00/0.0)	Begin Rock Coring at 50.0 ft bgs			
_					See the next sheet for the rock core log			_
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722845.8 N, 458024.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240; CME 55 S/N 299205, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 2.3	ft bgs	s on 6/	30/07 START : 4/19/2007 END : 4/	23/200	07 LOGGER : D. Roraback	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACING
A S S S S S S S S S S S S S S S S S S S	RUR VER	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	OLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
	ORE	Ø	RAC:	PLANARITY, INFILLING MATERIAL AND	YMB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
		ď	# #	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	,
-7.5 -	50.0			_	Н	No Recovery 50.0-55.0'	Rock core logged by D. Roraback and P. De
_					Н	_	Sa'Rego _
_					ш	_	
_					Ш	_	Driller's Remark: Possible sand layer; tagged bottom -
_	R1-NQ 5 ft	0	NR		Н	_	at 55' below ground
_	0%			_	H	_	surface
_				_		_	_
_				_	Н	_	1
_				_	Н	_	R1: 16 minutes
55	55.0				$\square$	1:	
-12.5			4	55.3' - Fracture, 20 deg, rough, undulating,	H	Limestone 55.0-59.75' - pale yellowish brown,	-
_				open 55.55' - Fracture, 10 deg, rough, undulating,	₽	(10YR 6/4), fine to medium grained,	1
_			4	open	Ш	mild delayed HCl reaction, extremely weak to very weak (R0 to R1),	1
_	50.110			55.7-55.75' - Fracture, 30 deg, rough, planar 55.8' - Fracture, horizontal, rough, undulating,	ш	variable 10-20% voids to 1/16", trace casts/cavities up to 3/8"x3/8"	1
_	R2-NQ 5 ft	0	7	lenticular -	ш	- throughout run, 30-40% cavities at	1
_	94%			55.95-56.0' - Fracture, 20 deg, rough, undulating, open	Н	56.0-56.15' 	
_			>10	56.15' - Fracture, 20 deg, rough, undulating,	H	_	R2: 11 minutes
-				open 56.4-56.7' - Fracture zone	H	_	-
_			5	56.8, 56.85, 56.95, 57.05, 57.2, 57.3, 57.5' -	H	_	Rig switched out partway
60 <u> </u>	60.0		NR	Fractures (7), <10 deg, rough, undulating, — — — —	Н	No Recovery 59.75-60.0'	through boring due to —
-			1	57.7-57.8' - Fracture zone	Н	<b>Limestone</b> - 60.0-62.6' - yellowish gray, (5Y 7/2),	mechanical issues change to CME 55 rig SN
-				57.9, 58.1' - Fractures (2), horizontal, rough, undulating, open	ш	fine to medium grained, mild delayed	299705 at 60'
-			2	58.15-58.3' - Fracture zone 58.5, 58.6, 58.8' - Fractures (3), 10 deg,	ш	HCl reaction, weak (R2), 15-20% voids up to 1/16", trace voids up to	Driller's Remark: Water
-	R3-NQ			rough, undulating, open	$\Box$	<ul> <li>1-3/16" by 3/8", thread-like black mottling up to 1-9/16" by 1/32" at</li> </ul>	level at 2.3' below ground -
-	5 ft	9	1	59.1-59.3' - Fracture zone 59.6, 59.75' - Fractures (2), 10 deg, rough,	+	62.4'-62.8'	surface SC-1 collected at 60.15-
-	52%			undulating, open	H	No Recovery 62.6-65.0'	61.20'
-				60.1, 61.5' - Fractures (2), horizontal, rough, undulating, open	H	_	-
-			NR	61.85-62.1' - Fracture, 60 deg, rough,	H	_	-
-				undulating 62.5' - Mechanical break	Н	_	R3: 5 minutes
65 <u> </u>	65.0			65.1, 65.2, 65.35, 65.5, 65.7, 66.3' -	H	Limestone	-
_			5	Fractures (6), <10 deg, rough, undulating,	H	<ul> <li>65.0-68.9' - moderate yellowish</li> </ul>	-
-				open	団	brown, (10 YR 5/4), mild delayed HCl reaction, weak (R2), 25-30% voids	-
-			1	-	Ш	<ul> <li>up to 3/16", no visible cavities except 67.75-67.95': large 3-1/8" by 2"</li> </ul>	-
-	R4-NQ			67.15, 67.5' - Mechanical break (2)	${\mathbb H}$	infilled with medium gray (N5),	-
-	- 5 ft	42	3		Ħ	<ul> <li>medium strong (R3) fine grained carbonate</li> </ul>	-
-	78%			67.7' - Fracture, horizontal, rough, undulating, open	Ħ	_ carbonate	-
-			2	68.2' - Mechanical break	Ш	_	-
-				68.7' - Fracture, horizontal, rough, undulating, open	${\mathbb H}$	No Recovery 68.9-70.0'	R4: 4 minutes
70	70.0		NR	· ·	H	<u></u>	1
//	<i>1</i> U.U				Ħ		<del> </del>



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338884.FL	B-25	SHEET	5	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722845.8 N, 458024.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240; CME 55 S/N 299205, mud rotary, NQ tools, HW casing

ORIENTATION: Vertical WATER LEVELS: 2.3 ft bgs on 6/30/07 START: 4/19/2007 END: 4/23/2007 LOGGER: D. Roraback DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) 9 DEPTH BELOW SURFACE AND ELEVATION (ft) ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, **DESCRIPTION** FRACTURES PER FOOT SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -27.5 Limestone 2 70.35' - Fracture, horizontal, rough, 70.0-72.5' - Same as 65.0-68.9' undulating, open except black (organic) 1/8" thick irregular laminae at 72.3' and 70.95' - Mechanical break 0 moderately fossiliferous at 72 35-72 5' 72.5-74.3' - pale yellowish brown R5-NQ mottled with dark yellowish brown, (10YR 6/2 and 10YR 4/2), fine to 50 3 72.35, 72.5' - Fractures (2), horizontal, rough, 5 ft undulating, open 72.8, 73.0-73.05' - Fractures (2), 30 deg, 86% medium grained, mild delayed HCI reaction, weak (R2), 10% voids up to 3 rough, undulating, open 73.4' - Fracture, <10 deg, rough, undulating, 1/16", trace cavities to 3/4" x 3/8", trace black (organic) thread-like R5: 8 minutes open mottles at 73.6 73.6' - Mechanical break NR No Recovery 74.3-75.0' 74.2' - Fracture, horizontal, rough, undulating, 75 75.0 -32 5 open Limestone 2 75.1' - Fracture, horizontal, rough, undulating, 75.0-76.9' - Same as 72.5-74.3' open except very weak to weak (R1 to R2), 75.25, 75.8' - Mechanical break (2) 80% dark yellowish brown mottled 2 75.6' - Fracture, horizontal, smooth, planar, from 75.6-76.15' 76.4-76.9' - moderate yellowish open 76.2, 76.45' - Fractures (2), horizontal, rough, brown, (10YR 5/4), fine grained, mild R6-NO HCl reaction, weak to medium strong (R2 to R3), 15-20% voids up to 3/16", 5 undulating, open 5 ft 69 76.7-77.5' - Fracture, 85 deg, rough, 100% undulating, tight to open over depth no visible casts/cavities 77.1-77.5' - Fracture, 85 deg, parallel to 76.9-78.7' - pale yellowish brown to 1 moderate yellowish brown, (10YR 6/2 above 77.5, 77.6' - Mechanical break (2) to 10YR 5/4), fine grained, mild HCI R6: 12 minutes 77.6-77.7' - Fracture, vertical, rough, reaction, medium strong (R3), no 1 undulating, open visible voids, 10% casts/cavities up 80 80.0 77.75' - Fracture, vertical, rough, stepped to 2-3/8" by 9/16", infilled with -37 5 78.15' - Fracture, <10 deg, smooth, planar material similar to 76.4-76.9' 2 78.7-80.0' - Same as 65.0-68.9' 80.0-83.05' - moderate yellowish 79.75-79.8' - Fracture, 30 deg, rough, undulating, open 80.6-80.7' - Fracture, 45 deg, rough, brown, (10YR 5/4), fine to medium 1 undulating, open 80.8-81.2' - Fracture, 60 deg, rough, grained, mild HCl reaction, weak to medium strong (R2 to R3), 15% voids up to 3/16", 10% casts/cavities up to 1-3/16" by 3/4", poorly R7-NQ undulating, open 5 ft 40 2 82.5' - Mechanical break fossiliferous 82.95-83.15' - Fracture zone <10 83.05-83.6' - yellowish gray to very 83.3-83.6' - Fracture, 60 deg, rough, pale orange, (5Y 7/2 to 10YR 8/2), undulating, open 83.5-83.6' - Fracture zone fine grained, mild HCI reaction, R7: 8 minutes NR medium strong to strong (R3 to R4), trace voids to 1/16", 15-20% casts/cavities up to 1-9/16" x 3/4", 85.0 42.5 85.2, 85.25, 87.0' - Mechanical break (3) infilled with material similar to 2 85.45-85.5' - Fracture, 30 deg, rough, 80.0-83.5' undulating, open 85.7-85.85' - Fracture, 60 deg, rough, No Recovery 83.6-85.0' Limestone 2 85.0-87.4' - moderate yellowish undulating, open brown, (10YR 5/4), fine to medium 86.35' - Fracture, horizontal, rough, R8-NQ undulating, open grained, mild HCl reaction, extremely 38 2 5 ft weak to very weak (R0 to R1), 86.6' - Mechanical break 75% 10-15% voids up to 1/16", trace 87.2-87.5' - Fracture, 60 deg, rough, undulating 87.75-87.8' - Fracture, 30 deg, smooth, casts/cavities up to 3/8" x 9/16" at 1 85.5-85.7 undulating, black (organic?) clay infill up to R8: 9 minutes 1/16" thick, open NR 90 90.0



FRACTURES PER FOOT

open

RQD(%)

WATER LEVELS: 2.3 ft bgs on 6/30/07

CORE RUN, LENGTH, AND RECOVERY (%)

DEPTH BELOW SURFACE AND ELEVATION (#)

-47.5

PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-25	SHEET	6	OF	9	

#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1722845.8 N, 458024.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

END: 4/23/2007

L0G

1/16"

CORING METHOD AND EQUIPMENT: Dietrich D-50 S/N 240; CME 55 S/N 299205, mud rotary, NQ tools, HW casing

START: 4/19/2007

DESCRIPTION

DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS

88.6' - Fracture, horizontal, rough, undulating,

90.6-90.65' - Fracture or mechanical break, 30 deg, rough, undulating, open

DISCONTINUITIES

LOGGER : D. Roraback LITHOLOGY COMMENTS ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. CHARACTERISTICS 87.4-88.75' - Same as 85.0-87.4' except very weak to weak (R1 to R2), and at 87.7-88.2' trace voids up to

ORIENTATION : Vertical

-			1	91.1-91.2' - Fracture or mechanical break, 60	世	No Recovery 88.75-90.0'	-
-	R9-NQ			deg, rough, undulating, open 92.05-92.15' - Fracture, horizontal, rough,	$\coprod$	Limestone 90.0-92.3' - pale yellowish brown,	-
-	5 ft	72	4	undulating, open	+	- (10YR 6/2), fine to medium grained,	1
_	95%			92.5' - Fracture, horizontal, rough, undulating, open	世	mild HCl reaction, medium strong (R3), 5-10% voids up to 1/8" in size,	
_			>10	92.5-92.8' - Fracture, 75 deg, rough,	+	- casts/cavities up to 9/16"x3/8"	-
_				undulating, open	$\Box$	92.3-92.5' - Same as 90.0-92.3' except 20% thin (1/16") organic (dark	l
_			1	92.65' - Fracture, horizontal, rough, undulating, open	+	brown to black) laminae	R9: 9 minutes
95	95.0		NR	93.0' - Mechanical break		92.5-94.75' - Same as 90.0-92.3'	
-52.5				93.7-94.2' - Fracture zone	Т		
_			2	94.2-94.3' - Fracture, 45 deg, rough, undulating, open	$\Box$	No Recovery 94.75-95.0'	1
_				95.1-95.3' - Fracture, 60 deg, smooth,	+++	Limestone	-
_			0	undulating	$\Box$	95.0-97.3' - Same as 90.0-94.75' except pale yellowish brown to	1
_	R10-NQ			95.75' - Fracture, horizontal, rough, undulating, open	卄	moderate yellowish brown, (10YR 6/2	-
_	5 ft	57	5	97.05' - Fracture, horizontal, rough,	+	_ to 10YR 5/4)	4
_	80%			undulating, tight	$\perp$	97.3-98.15' - pale yellowish brown to moderate yellowish brown, (10YR 6/2	<u> </u>
			>10	97.5, 97.5-97.6, 97.6' - Mechanical break (3) 97.85' - Fracture, horizontal, rough,		to 10YR 5/4), fine grained, mild HCl	
· <del>-</del>			- 10	undulating, open	Ш	reaction, medium strong (R3),	1
_				98.25' - Fracture, 5 deg, smooth, planar,	$\Box$	10-15% voids up to 3/16", 10% cavities up to 9/16"x3/8", trace black	R10: 12 minutes
400	400.0		NR	open, 25% black staining on surface 98.4' - Fracture, horizontal, smooth, planar,	$\Box$	pyrite infilling of cavities	1
100 <u> </u>	100.0			open 98.4 - Fracture, Horizontal, Sillootti, pianar,	₩	98.15-99.0' - Same as 90.0-94.75'	I →
-			>10	98.6-98.7' - Fracture, 45 deg, rough,	$\pm$	except no visible cavities	-
_				undulating, open 98.7-99.0' - Fracture zone	+	No Recovery 99.0-100.0' - Limestone	_
			>10	100.0-100.3' - Fracture zone	$\perp$	100.0-103.75' - pale yellowish brown	_
			10	100.3' - Fracture, 10 deg, rough, undulating,	Ш	to moderate yellowish brown, (10YR	
_	R11-NQ			open	Ш	<ul> <li>6/2 to 10YR 5/4), fine grained, mild HCl reaction, weak to medium strong</li> </ul>	1
_	5 ft 75%	20	0	100.55, 100.65' - Fractures (2 parallel), 20 deg, rough, undulating, open	+	(R2 to R3), 10% voids up to 1/8",	SC-2 collected at 102.0-
_	1370			100.55-100.65' - Fracture, 40 deg, rough,	廿	<ul> <li>10% casts/cavities up to 3/8"x3/4" at</li> </ul>	103.0'
_			7	undulating, open, running between above	+	100.36-100.65', 101.7-101.9', and 103.2-103.75'	-
_				fractures 100.65-100.9, 100.9-101.1, 101.1-101.3' -	坦	- No Recovery 103.75-105.0'	D44: 0
_			NR	Fractures (3), 60 deg, rough, undulating,	H	<u>-</u>	R11: 9 minutes
105	105.0			open, some fragments associated with	ቯ		
-62.5				fractures – 101.3-101.4' - Fracture, 50 deg, rough,	Н	Limestone	]
_			>10	planar, open	ш	<ul> <li>105.0-109.5' - pale yellowish brown to moderate yellowish brown, (10YR)</li> </ul>	1
_				101.55-101.7' - Fracture zone	+	6/2 to 10YR 5/4), fine grained, mild	Driller's Remark: 106-107'
-			4	102.0, 103.0' - Fractures (2), horizontal, rough, undulating, open		- HCl reaction, weak to medium strong	Soft drilling -
-	R12-NQ			103.2-103.3' - Fracture, 45 deg, rough,	+++	(R2 to R3), 10% voids to 1/16" throughout run, 25% casts/cavities	"Pushed right through"
_	5 ft	43	5	undulating, open	$\Box$	- up to 9/16"x3/8" at 105.0-105.2',	]
_	90%			103.65-103.75' - Fracture zone 105.35-105.85' - Fracture zone	H	trace casts/cavities, up to 9/16"x3/8"	]
			9	105.85-105.95' - Mechanical break, vertical		throughout entire run.	
_			9	105.85, 105.95, 106.1, 106.35' - Mechanical	Н	_	1
_			4	break (4) 106.55' - Fracture, horizontal, rough,	口	-	R12: 9 minutes
140	440.0		NR	undulating, open	+++	No Recovery 109.5-110.0'	-
110	110.0		'		冄	<u> </u>	-
			1				



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-25	SHEET	7	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722845.8 N, 458024.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

CORING METHOD AND EQUIPMENT: Dietrich D-50 S/N 240; CME 55 S/N 299205, mud rotary, NQ tools, HW casing

ORIENTATION: Vertical WATER LEVELS: 2.3 ft bgs on 6/30/07 START: 4/19/2007 END: 4/23/2007 LOGGER: D. Roraback DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, FRACTURES PER FOOT **DESCRIPTION** SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -67.5 106.75' - Fracture or mechanical break, 40 Limestone >10 deg, rough, undulating, open 110.0-113.3' - moderate yellowish 107.5' - Mechanical break brown, (10YR 5/4), fine grained, mild 107.6' - Fracture, horizontal, rough. HCI reaction, very weak (R1) from undulating, open 107.6-108.05' - Fracture zone 110.0-110.5', weak (R2) from 110.5-113.5', 10% voids up to 1/16", 3 107.6-108.1' - Mechanical break, >80 deg, trace casts/cavities up to 9/16"x2", R13-NQ 50 2 one face fractured as described above trace thin dark organic inclusions 5 ft 108.25' - Mechanical break 66% (3/4" x 1-3/16") at 112.6 2 108.8' - Fracture, 20 deg, smooth, undulating, No Recovery 113.3-115.0' 108.8-109.2, 109.1-109.5' - Fractures (2), 70 deg, rough, undulating, open NR R13: 6 minutes 109.05, 109.25' - Fractures (2), horizontal, rough, undulating, open 115\_\_115.0 110.0-110.5' - Fracture zone -72 5 Limestone 111.1' - Fracture or mechanical break, 115.0-116.4' - Same as 110.0-113.3' 1 horizontal, rough, undulating, open 111.7-111.85, 111.95-112.05' - Mechanical except 10-15% voids up to 1/16", and no visible casts/cavities break (2) 1 116.4-117.7' - moderate yellowish 112.5' - Fracture, 10 deg, rough, undulating, brown, (10YR 5/4), fine grained, mild open SC-3 collected at 116.4-R14-NO HCl reaction, very weak (R1), trace 113.1' - Fractures (2 separated by 1/4"), 15 58 1 117.5 5 ft voids up to 1/16", no visible 97% deg, rough, undulating, open casts/cavities 115.1-115.45' - Fracture, 75 deg, rough, 117.7-118.4' - Same as 110.0-113.3' undulating, open, trace black (pyrite) staining except very weak (R1) at 118.0-118.15' and trace voids up to 7 <1/16" thick on surface 116.4' - Fracture, horizontal, smooth, 1/16", no visible casts/cavities R14: 7 minutes undulating, open >10 throughout 117.75, 118.05' - Mechanical break (2) 118.4-118.95' - Same as 116.4-117.7' 120 120.0 NR 118.5, 118.6' - Fractures (2), horizontal, -77 5 rough, undulating, open, some fragments 118.55, 118.65' - Mechanical break (2) 5 118.95-119.85' - Same as 116.4-117.7' except very weak (R1) 118.8, 118.95' - Fractures (2), horizontal, at 119.33-119.65 rough, undulating, open 119.35-119.65' - Fracture zone >10 No Recovery 119.85-120.0 Limestone 120.4' - Mechanical break 120.0-122.4' - pale yellowish brown R15-NO 1 120.6' - Fracture, horizontal, rough, to moderate yellowish brown, (10YR 11 5 ft undulating, open 120.85-120.95' - Fracture zone, 4 fragments 48% 6/2 to 10YR 5/4), fine to medium (coarser with depth) grained, mild Driller's Remark: "Soft at 121.2-121.3' - Fracture zone HCl reaction, medium strong (R3), 123.5 to 124 feet" NR 121.5' - Fracture, 5 deg, rough, undulating, trace voids to 1/16", trace open, associated with large cavity casts/cavities to 3/8"x3/8" except at R15: 11 minutes 121.7' - Fracture, horizontal, rough, 120.5-120.7' and 121-121.7': with undulating, open 15-20% casts/cavities, up to 2" x 3/4" 125 125.0 121.9-122.4' - Fracture or mechanical break, x 3/4" "deep", partially infilled with -82.5 60 deg recrystalized carbonate material >10 125.0-125.3' - Fracture zone moderate yellowish brown (10YR 125.4' - Mechanical break 5/4), weak, poorly fossiliferous, trace 125.65, 125.9' - Fractures (2), horizontal, dark gray pyrite or organic material 2 rough, undulating, open mottling at 121.9-122.0' 126.1-126.15' - Fracture, 25 deg, rough, No Recovery 122.4-125.0' R16-NQ undulating, tight 4 5 ft 30 126.25-126.3' - Mechanical break, 25 deg, 76% healed 127.225, 127.25, 127.5' - Fractures (3), 3 horizontal, rough, undulating, open 127.6' - Fracture, horizontal, rough, planar, R16: 13 minutes open to tight NR 127.85' - Fracture, horizontal, rough, planar, 130 130.0 open



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-25	SHEET	8	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722845.8 N, 458024.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240; CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.3	8 ft bgs	s on 6/	30/07 START : 4/19/2007 END : 4/2	23/20	07 LOGGER : D. Roraback	
≥∩≘	(6)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-87.5 -	014	т.	1	128.2' - Fracture, 20 deg, rough, undulating, open - 128.3-128.45' - Mechanical break, 45 deg,		Limestone - 125.0-128.8' - moderate yellowish brown, (10YR 5/4), fine grained, mild	
-	R17-NQ		1	tight 128.45-128.5' - Mechanical break, 30 deg, tight 130.3' - Fracture, horizontal, rough,		HCl reaction, weak to medium strong (R2 to R3), 20% voids <1/32", trace voids to 1/15", trace spherical casts 3/16"-1/4", 3/8" spherical casts at	SC-4 collected at 130.3- 131.4' -
-	5 ft 61%	23	>10 1_/	undulating, open 131.4' - Fracture, 25 deg, rough, undulating, open 131.7' - Fracture, horizontal, rough, undulating, open		<ul> <li>126.0, 126.8, 127.1', larger (2"x3/4")         cavities at 127.8' and 130.1',         moderately fossiliferous, partial         infilling (carbonate, very weak to         weak, medium grained) with</li> </ul>	-
135_ -92.5	135.0		NR	131.95-132.05' - Fracture, 45 deg, rough, undulating, open, likely due to cavity 132.2, 132.4, 132.5' - Fractures (3), horizontal, rough, undulating, open		weak, friedining rained, with recrystalized material  No Recovery 128.8-130.0'  Limestone  130.0-133.05' - pale yellowish brown	R17: 11 minutes -
-			>10	132.5-132.7' - Fracture, vertical, rough, undulating, open 132.6-132.65' - Fracture, 30 deg, rough, undulating, open		to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, mild HCl reaction, weak (R2), trace voids up to 1/16", trace cavities up to	-
-	R18-NQ 5 ft	7	>10	132.9-133.05' - Fracture zone 135.15-135.35' - Fracture zone 135.45' - Fracture, horizontal, smooth, planar to undulating, open		1-3/16" by 3/16", well-formed casts to 3/4" x 3/4" x 3/8" "deep" at 132.8' No Recovery 133.05-135.0' Limestone	
- - -	44%		NR	135.65, 135.7, 135.75, 135.85, 136.05, 136.2, 136.4, 136.45, 136.5' - Fractures (9), horizontal, rough, planar to undulating, open 136.7-136.8' - Fractured rock fragments (3), horizontal, rough, planar to undulating, open		135.0-135.65' - pale yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, medium strong (R3), <2% voids up to 1/16", single cavity 2-3/4" by 9/16" at 135.45-135.5', infilled with	- - R18: 7 minutes
140_ -97.5	140.0		1	_	Ħ	material similar to 130.0-133.05'  135.65-137.2' - pale yellowish brown to moderate yellowish brown, (10YR	_
-			1	140.8' - Fracture, <10 deg, rough, undulating, open		6/2 to 10YR 5/4), fine grained, mild  HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over 10% of surface, scattered (<5%) larger voids	-
- -	R19-NQ 5 ft 76%	48	8	undulating, open  142.4-142.5' - Fracture zone  142.65-142.75' - Fracture zone		<ul> <li>up to 3/16", trace cast/cavities up to 9/16"x3/16", 5-10% gray shell fragments inclusions at</li> <li>136.85-137.2', mottled dark brown at</li> </ul>	- - -
-			1 NR	143.6' - Fracture, 10 deg, rough, planar, open		136.4-136.45 <sup>-/-</sup> No Recovery 137.2-140.0' Limestone 140.0-141.3' - pale yellowish brown	- R19: 14 minutes
145 -102.5	145.0		INIX	<u> </u>	H	to moderate yellowish brown, (10YR — 6/2 to 10YR 5/4), fine to medium grained, mild HCl reaction, weak to	]
-			2	145.45' - Fracture, horizontal, rough, undulating, open 145.7' - Mechanical break	H	medium strong (R2 to R3), voids (1/16") over 10% of surface, trace casts/cavities up to 1-3/16" by 3/8",	]
-	R20-NQ		>10	146.15-146.3' - Fracture zone, 50% dark brown staining on surfaces -	Ħ	partially infilled with similar material to matrix, black pyrite staining at	-
-	5 ft 82%	60	5	146.95' - Mechanical break 147.5-147.6' - Fracture, 70 deg, rough, undulating, open		141.15-141.2' and 142.3-142.35' 141.3-141.6' - light gray, (N7), fine grained, moderate HCl reaction, medium strong (R3)	
-			1	148.2-149.1' - Mechanical break, 80 deg	H	141.6-142.4' - Same as 140.0-141.3'	- R20: 17 minutes
150	150.0		NR	149.1-150.0' - Mechanical break	Ė	_	1720. 17 Hillinutes –

ORIENTATION : Vertical



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-25	SHEET	9	OF	9	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1722845.8 N, 458024.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani; Cathead Operator: S. Hutchinson

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 240; CME 55 S/N 299205, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 2.3	3 ft bgs	on 6/	30/07 START : 4/19/2007	END : 4/2	3/200	7 LOGGER : D. Roraback	
≥ ∩ ः	(9)			DISCONTINUITIES		ڻ ق	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGH PLANARITY, INFILLING MATERIAL THICKNESS, SURFACE STAINING, AND T	AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
							142.4-143.8' - very pale orange, (10YR 8/2), very fine grained, mild HCI reaction, medium strong to strong (R3 to R4), trace voids to 1/16", trace casts up to 1"x3/16" across unit; large (50% volume of core) cavity at 143.15-143.2', mottled light gray (N7) at 142.8-143.3' No Recovery 143.8-145.0' Limestone 145.0-145.7' - very pale orange, (10YR 5/2), fine grained, mild HCI reaction, medium strong (R3), poorly fossiliferous, 5% voids up to 1/16", trace casts/cavities up to 1"x3/16", poorly infilled with black fine grained "powdery" material 145.7-146.3' - Same as 145.0-145.7' except mottled yellowish gray, (5Y 7/2) 146.3-146.45' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCI reaction, weak to medium strong (R2 to R3), 25-30% voids up to 1/16", moderately fossiliferous, sharp contacts above and below 146.45-147.5' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCI reaction, thin (<1/8") planar to irregular dark brown laminae, no voids, trace casts 147.5-147.8' - moderate yellowish brown, (10YR 5/4), medium grained, moderate HCI reaction, medium strong (R3), trace voids up to 1/16", no casts, poorly fossiliferous 147.8-148.2' - Same as 146.45-147.5' except grades into unit below 148.2-149.1' - Same as 147.5-147.8' except highly fossiliferous and 25% casts up to 9/16"x9/16" at 148.8-149.2' No Recovery 149.1-150.0' Bottom of Boring at 150.0 ft bgs on 4/23/2007	



PROJECT NUMBER: BORING NUMBER:

338884.FL B-25A

SOIL BORING LOG

SHEET 1 OF 3

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.0 N, 458017.4 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550, S/N 186073, mud rotary, cathead, AWJ rods

ORIENTATION: Vertical

WATER	LEVELS	: 4.5 ft b	gs on 11/2	27/08	START : 11/27/2007 END : 11/27/2007 LOGGER : D. Thomas
				STANDARD PENETRATION	SOIL DESCRIPTION COMMENTS
AND (#)	SAMPLE	INTERVA	0073		
H H H		RECOVE	ERY (ft)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
<u>42.2</u>	0.0			(N)	Limestone Fill 2-7/8" tricone bit
-	0.0	1.5	SS-1	3-5-7	$0.0$ -0.2' - dark yellowish orange, (10YR 6/6), strong $-\frac{y}{2}$ This boring is being drilled for hammer test
-	1.5	1.0	00 1	(12)	\(\begin{array}{c c c c c c c c c c c c c c c c c c c
-	1.5				0.2-1.5' - grayish black, (N2), moist, medium stiff, nonplastic, no HCl reaction, trace very fine sand
-					increasing to 10% with depth, wood at 1.3'
_					1
_					1
					]
_					<b>]</b>
5	5.0				
37.2				3-2-3	Lean Clay (CL)  5.0-5.1' - grayish black, (N2), wet, medium plasticity,
_		0.4	SS-2	(5)	\\no HCl reaction, trace very fine sand \\ \  \_
_	6.5				Silty Sand (SM) 5.1-5.4' - dark yellowish orange, (10YR 6/6), wet,
-					loose, very fine to fine grained, 15% nonplastic fines, 5% fine organic particles
-					
-					
-					
-					† <b>†</b>
10	10.0				<b>†  </b>
32.2	10.0				Fat Clay (CH) 10.0-10.1' - light greenish gray, (5G 8/1), moist to wet.
		1.0	SS-3	1-1-2 (3)	soft, high plasticity, no dilatancy, no HCl reaction,
	11.5			(0)	trace very fine silica sand
_					Silty Sand (SM)   10.1-10.3' - light olive gray, (5Y 6/1), wet, very loose,
_					very fine to fine grained, no HCl reaction, 20% low
_					Fat Clay With Sand (CH)
_					10.3-10.95' - Same as 10.0-10.1' except 15% very fine silica sand
-					
15 27.2	15.0				Fat Clay (CH) Changed to 2-7/8" drag bit
-		1.3	SS-4	3-5-5	\ 15.0-15.3' - light greenish gray, (5G 8/1), wet, stiff,     -   /
-	16.5	'	55-4	(10)	∭that can be crushed, no HCl reaction with silty/clay
-	10.0				matrix, strong HCl reaction for sand material     -
-					
-					HCI reaction, 20-25% low plastic fines  Fat Clay (CH)
_					15.4-15.9¹ - Same as 15.0-15.3¹
					Silty Sand (SM) 15.9-16.25' - Same as 15.3-15.4'
					]
20					
			l		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-25A	SHEET	2	OF	3

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.0 N, 458017.4 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550, S/N 186073, mud rotary, cathead, AWJ rods

ORIENTATION · Vertical

DRILLIN	DRILLING METHOD AND EQUIPMENT : CME 550, S/N 186073, mud rotary, cathead, AWJ rods  ORIENTATION : Vertical									
WATER	WATER LEVELS: 4.5 ft bgs on 11/27/08 START: 11/27/2007 END: 11/27/2007 LOGGER: D. Thomas									
<b> </b> _				STANDARD	SOIL DESCRIPTION	<sub>0</sub> [	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE INTERVAL (ft)  PENETRATION TEST RESULTS  COULDAME LIGGE CROUD CYANDOL COLOR					SYMBOLIC LOG				
L BE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	٦ ا	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
PTF EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	, WB	INSTRUMENTATION			
SUS				(N)		Ś				
22.2	20.0			3-4-4	Fat Clay (CH)  ─ 20.0-20.4' - Same as 15.0-15.3' /=[		Driller's Remark: Continue to lose circulation			
_		1.1	SS-5	(8)	Silty Sand (SM)		Fot alove and either and alternating from 101 (if			
_	21.5				20.4-20.7' - Same as 15.3-15.4' Fat Clay (CH)		Fat clay and silty sand alternating from 10' (if not from 5')			
_					20.7-21.1" - Same as 15.0-15.3' and 20.0-20.4'		, 			
-							_			
_							_			
_							_			
_							_			
_										
25	25.0									
17.2				4-3-2	Fat Clay (CH)  25.0-25.3' - light greenish gray, (5G 8/1), wet, soft,	41	_			
_		1.3	SS-6	(5)	high plasticity, no dilatancy, mild HCl reaction, trace	Щ	_			
_	26.5				fine to coarse carbonate sand/fragments with strong   HCl reaction, (predominantly carbonate fragments)	44				
_					Silty Sand (SM)		_			
_					25.3-26.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), wet, loose, very fine grained, no HCl		_			
_					reaction, 25-30% low plastic fines		_			
_					Clayey Sand (SC) 26.0-26.3' - light greenish gray to light olive gray, (5G		_			
_					8/1 to 5Y 5/2), wet, loose, very fine to fine grained,					
_					35% low to medium plastic fines					
30	30.0						_			
12.2				5-7-8	Fat Clay With Sand (CH)   ¬ 30.0-30.4' - light greenish gray to light bluish gray, (6G /=1)					
_		1.5	SS-7	5-7-6 (15)	\ 8/1 to 5B 7/1), moist, soft, medium plasticity, no HCl		_			
_	31.5				\reaction, 20% very fine silica sand \rightarrow \text{Silty Sand (SM)}		_			
_					30.4-31.5' - yellowish gray, (5Y 7/2), wet, medium		_			
_					dense, very fine grained, no HCl reaction, 25% nonplastic fines, irregular shaped lens of fat clay (CH)		_			
_					from 31.0-31.5'		_			
_							_			
_							_			
_										
35	35.0				<u> </u>					
7.2				E 4 4	Fat Clay (CH) ── 35.0-35.4' - Same as 30.0-30.4' /=		Driller's Remark: Continuing to lose circulation/ water since 15-20' bgs (about 25			
_		1.5	SS-8	5-4-4 (8)	Silty Sand (SM)		gallons per 5 foot run)			
_	36.5			, ,	35.4-36.5' - Same as 30.4-31.0 except loose	Ш	_			
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						- 1	]			
40						$\Box$				
						$\sqcap$				



PROJECT NUMBER:	BORING NUMBER:
338884.FL	B-25A

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.0 N, 458017.4 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550, S/N 186073, mud rotary, cathead, AWJ rods

ORIENTATION : Vertical

SHEET 3 OF 3

WATER LEVELS: 4.5 ft bgs on 11/27/08  START: 11/27/2007  END: 11/27/2007  LOGGER: D. Thomas								
WATER	LEVELS	. 4.3 IL D <u>Q</u>	49 OII II/2		SOIL DESCRIPTION COMMENTS			
중요윤	SAMPI F	INTERVA	J (ft)	STANDARD PENETRATION	8			
BELC HE AI	O, WVII EL	RECOVE	· ,	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION			
YH I			#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY SINSTRUMENTATION			
DEPTH BELOW SURFACE AND ELEVATION (ft)			#1175	(N)	l I I			
2.2	40.0	1.3	SS-9	4-2-4	Silt With Sand (ML)  \[ \square 40.0-40.4' - light olive gray, (5Y 5/2), moist, medium \] \[ \square 7 - 1111 \] \[ \square 7 - 1111 \]			
-	44.5	1.3	33-9	(6)	\stiff, low plasticity, rapid dilatancy, no HCl reaction, \square 1 \]			
-	41.5				Silt With Sand (ML)			
-	1				\ \ 40.4-41.3' - light olive gray transitioning to olive gray, \ (5Y 5/2 to 5Y 3/2), moist to wet, medium stiff, low to			
-	1				medium plasticity, 25% very fine silica sand, organic soil (OL/OH) seams 1/4" thick			
-	1				-			
-					1			
-					Driller's Remark: Rocky, chatter at 44'			
45_	45.0							
-2.8	45.4	0.4	SS-10	50/4.5 (50/4.5")	Silt (ML)  Variable Silt (ML)  Driller's Remark: Changed back to tricone bit			
_				(00/4.0)	\nonplastic, rapid dilatancy, mild HCl reaction, trace /			
-					\limestone fragments up to 1/8", carbonate material \int \int \int \int \int \int \int \int			
-					organic soil (OL), olive gray (5Y 3/2), wet,			
-					soft, low to medium plasticity, rapid dilantancy, no HCl reaction, 10% fine silica			
-					sand			
-								
-					Driller's Remark: Firm drilling from 44-49',			
					soft again from 49-50'			
50 -7.8	50.0				Silty Sand And Limestone (SM)  For SS-11, 2.1' of soil in spoon; top 0.6'			
-		1.5	SS-11	15-25-36	50.0-51.5' - light olive gray, dusky yellow, and			
-	E4 E	1.5	00-11	(61)	moderate olive brown, (5Y 5/2, 5Y 6/4, and 5Y 4/4), fine to coarse grained, mild HCl reaction, 20-30% low			
-	51.5				plastic fines (varies in sample), fine to coarse gravel-sized limestone fragments, carbonate			
-	1				materials / 11/27/2007 at 17:00 water level = 4.5' bgs			
-					Bottom of Boring at 51.5 ft bgs on 11/27/2007 - 11/28/2007 at 08:00 water level = 4.0' bgs			
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PROJECT NUMBER:	BORING NUMBER:	
338884.FL	B-26	SHEET 1 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723010.2 N, 458111.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT. CIVIE 330 3/N 1000/3, ITIU0 IDIAIly, Califeau, AWJ 1005, 3-7/6 (IT-corie bit Onientation : Vertical										
WATER	LEVELS	: 4.41 ft l	ogs on 3/	06/07	START : 2/21/2007	END: 2/23/2007	LOGGEF	ì : C.		
1				STANDARD	L	SOIL DESCRIPTION		(n	COMMENTS	
≳5€	SAMPLE	INTERVA	L (ft)	PENETRATION				Ŏ		
N A A	_			TEST RESULTS	SOIL NAME	E, USCS GROUP SYMBOL,	으	DEPTH OF CASING, DRILLING RATE,		
ASE		RECOVE	ERY (ft)		MOISTURE	URE CONTENT, RELATIVE DENSITY O		Ω Ω	DRILLING FLUID LOSS, TESTS, AND	
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	CONSISTENC	CY, SOIL STRUCTURE, MIN	IERALOGY	SYMBOLIC LOG	INSTRUMENTATION	
日の日				(N)				S		
42.4									Start drilling at 15:00 on 2/21/07	
_							_	1	"Water level is based on Ground Water - Monitoring at LNP site (FSAR Table	
-							-	l	2.4.12.08)"	
l -							-		18" of topsoil at ground surface	
l _							_		_	
-							-	1	-	
-							-	<b>!</b>	-	
_							-		_	
							<del>-</del>		1	
	<b>.</b> .						-	1	-	
5 37.4	5.0				Poorly Croded	Cand (CD)			SS-1 sampled at 15:10	
_ 57.4				3-2-2	Poorly Graded 5.0-5.5' - pale v	ellowish brown to modera	te vellowish -		- ου- ι δαπριεύ αι το.το -	
		0.5	SS-1	(4)	\ brown, (10YR 6	6/2 to 10YR 5/4), wet, very	loose, fine			
I -	6.5			( +)	\grained, no HC	I reaction, silica sand, trac	e nonplastic / -		1	
-	0.5				fines, trace fine	organics		l	-	
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l -							_		_	
10	10.0						_	1		
32.4	10.0				Silty Sand With	h Limestone Fragments (	SM)		SS-2 sampled at 15:25	
-		١.,	00.0	2-2-8	10.0-11.4' - vell	lowish grav. (5Y 8/1), wet.	loose, fine to -		-	
-		1.4	SS-2	(10)	coarse grained,	, strong HCI reaction, 26%	nonplastic _		_	
	11.5				to low plasticity	fines, 15-20% gravel-size nestone fragments, all carb	d			
					\lossilierous iiii	iestorie fragments, ali cart	Donale / -	1		
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I -							-		1	
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-							-		-	
15	15.0							<u> </u>		
27.4					Silty Sand With	h Limestone Fragments (	SM)			
1 -		1.0	SS-3	17-19-5	15.0-16.0' - Sar	me as 10.0-11.4'	=		-	
-				(24)					-	
-	16.5						-		-	
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-26	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723010.2 N, 458111.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

						r, cameau, Avvo rous, 5-7/6			ONIENTATION : Vertical
WATER	LEVELS	: 4.41 ft l	ogs on 3/	06/07	START : 2/21/2007	END: 2/23/2007	LOGGE	₹ : C.	
				STANDARD		SOIL DESCRIPTION		(T)	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR				
		SOIL NAME, USCS GROUP SYMBOL, COLOR,				DEPTH OF CASING, DRILLING RATE,			
ATI E		I DECOVE	<u> </u>					8	DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6"	CONSISTENCY	Y, SOIL STRUCTURE, MINE	ERALOGY	Σ	INSTRUMENTATION
<u>О</u> О Д	22.2			(N)	O:lt /MIL)			1111	
22.4	<del>2</del> 8:9	0.4	SS-4	50/6 (50/6")	Silt (ML)	wish gray, (5Y 8/1), wet, h	ard /	Ш	_
				(30/0)	nonplastic. very r	apid dilatancy, mild HCl r	eaction, all	1	
-					\carbonate, 5-10%	6 fine to medium sand-siz	ed /	1	_
-					•			┨	-
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I _								1	_
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-								1	
-								1	-
-								-	-
								1	_
25	25.0							1	
17.4	,,,				Silty Sand (SM)			$\Pi$	SS-5 sampled at 16:00
-		1.4	SS-5	40-47-44	25.0-26.4' - grayis	sh orange, (10YR 7/4), m	oist to wet,	111	
-		1.4	33-3	(91)	very dense, fine t	to coarse grained, modera onate, 35-40% nonplastic	ate HCI	<b>4</b>	-
_	26.5				المالية المالية المالية	onate, 55-40 /6 HompidStic			
								1	
								1	
-								1	-
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_								1	_
								1	
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								1	-
30 <u> </u>	30.0				Silt (ML)			1	
12.7		1.0	SS-6	47-50/6		yellowish orange, (10YR	6/6). moist	4111	_
	31.0			(97/12")	to wet, hard, none	plastic, very rapid dilatano	cy, mild to		
						action, 10-15% very fine g	grained /		
_					\sand-sized, carbo	onate materials		1	1
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35	35.0							1	
7.4					Sandy Silt (ML)				
		1.3	SS-7	23-33-50	35.0-36.3' - mode	erate yellowish brown, (10 blastic, very rapid dilatanc	YK 5/4), v. mild ⊔Cl	1	1
-				(83)	reaction, 40% fine	e to medium grained sand	y, mila moi d-sized	1	-
-	36.5				carbonate materia			1	-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-26	SHEET	3	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723010.2 N, 458111.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

WATER	LEVELS	: 4.41 ft b	ogs on 3/0	06/07	START : 2/21/2007 END : 2/23/2007 LOGGER : C. LeBlanc
				STANDARD	SOIL DESCRIPTION COMMENTS
N AND	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
2.4	40.0 40.6	0.3	SS-8	46-50/1	Silty Sand And Limestone Fragments (SM) SS-8 sampled at 16:41
	10.0			(96/7")	\ \ \ 40.0-40.25' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, very
-					dense, fine to coarse grained, mild HCl reaction, 20% / nonplastic fines, 50% fossiliferous limestone
-					fragments
-					-
-					Driller's Remark: Rig chatter at 43.0'
-					Driller's Remark: Lost circulation at 43.0'
-					<b>-</b>
45_	45.0				
-2.6		0.7	SS-9	36-50/5	Sandy Silt (ML) 45.0-45.7' - pale yellowish brown to moderate
_	45.9			(86/11")	□ vellowish brown. (10YR 6/2 to 10YR 5/4), wet, hard.
-					nonplastic, very rapid dilatancy, mild to moderate HCI reaction, all carbonate, 35-40% fine to medium
-					sand-sized
-					-
-					<b>-                                    </b>
-					<b>†  </b>
-					<b>1</b>
50	50.0				1
-7.6	50.3	0.3	SS-10	50/4 (50/4") /	Sandy Silt (ML) 50.0-50.25' - Same as 45.0-45.7'  SS-10 sampled at 17:30
-					
-					-
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					]
_					_
55 <u> </u>	55.0 55.3	0.1	SS-11	50/4	☐ Limestone Fragments
-12.0	33.3		00-11	(50/4")	S5.0-55.1' - pale yellowish brown to moderate   - yellowish brown, (10YR 6/2 to 10YR 5/4), mild HCl
-					yellowish brown, (10YR 6/2 to 10YR 5/4), mild HCl / -
-					1
-					1
					]
-					] ]
-					
60					++
1					



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-26	SHEET	4 OF	<del>-</del> 9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723010.2 N, 458111.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

						ary, carriedu, Avvo 1005, 5-7/6 i			ONIENTATION : Vertical
WATER	LEVELS	: 4.41 ft l	ogs on 3/0	06/07	START : 2/21/2007	END: 2/23/2007	LOGGE	? : C.	
<b> </b>				STANDARD		SOIL DESCRIPTION		U	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				Š	
BE A		SOIL NAME, USCS GROUP SYMBOL, COLOR,				DEPTH OF CASING, DRILLING RATE,			
FAC		''	<u> </u>					B	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
교육교			#TYPE	6"-6"-6" (N)	CONSISTEN	ICY, SOIL STRUCTURE, MINEF	RALUGY	N.	INSTRUMENTATION
-17.6	60.0	0.3	SS-12	50/5	Silty Sand (SM	A\		111	SS-12 sampled at 08:00 on 2/22/07
-17.0	60:4	0.3	33-12	(50/5")	\ 60.0-60.3' - mo	oderate vellowish brown, (10Y	′R 5/4),	1.1.1	- 33-12 sampled at 00.00 on 2/22/07
					\ wet, very dense	e, fine to coarse grained, mile	HCI /		_
					reaction, 20% r	nonplastic fines, 15% organic	s, all		
_					carbonate exce	ept organics		1	_
-							-	1	-
-							-	ł	=
_								1	<u>_</u>
							-	1	_
-							-	1	=
-							-	1	-
65	65.0							<b> </b>	
-22.6				45.00.15	Sandy Silt (ML	L <b>)</b> ıme as 45.0-45.7'	-		SS-13 sampled at 08:20
]		1.5	SS-13	15-29-47 (76)	00.0-00.0 - Sa	uno do 40.0-40./			1
-	66.5			(70)			-	1	1
-	00.5							ш	-
-							-	1	-
_								1	_
							-	1	_
-							-	1	<del>-</del>
-							-	┨	-
_							-	l	_
70	70.0								
-27.6		١.,		19-50/6	Silt With Sand	I (ML)			
-	71.0	1.0	SS-14	(69/12")	/0.0-/1.0' - Sa	me as 65.0-66.5' except mild reaction, 20% fine to medium	to -	1	-
-	71.0				sand-sized	reaction, 20 % line to medium	'	₩	-
-					(04.14 0.204			1	-
_								1	_
							·-	1	_
-		1					-	1	-
-		1					-	1	-
-							-		00.45
							-		SS-15 sampled at 08:50 Switch to rock coring at 75.0'
75	75.0							L	Switch to lock coming at 75.0
-32.6	75.1	0.0	SS-15	50/1	Limestone Fra	agments	T mailed	Г	-
-				(50/1")	75.0-75.1' - few	w limestone fragments recove	erea, mild / .	1	-
-						oring at 75.0 ft bgs		1	-
_					See the next sh	heet for the rock core log	-		_
						3			
]							•		1
-								1	7
-								1	-
-								1	_
							-	1	
80							-	1	]
30								$t^{-}$	
		l .	l .	l .	I				



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-26	SHEET	5	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723010.2 N, 458111.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

COMING	IVIL IT IOD AI	AD EC	אורוטג	IENT: CME 550 S/N 186073, mud rotary, NQ tools, NW	casin	<u> </u>	ORIENTATION : Vertical
WATER	LEVELS: 4.4	1 ft b	as on 3	3/06/07 START : 2/21/2007 END : 2/	23/20	D7 LOGGER : C. LeBlanc	
			,	DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)				- PO-	LITIOLOGI	OCIVIIVILITIO
N S	z¥≿		ES_	DESCRIPTION	5	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
표임은	8번	(%) <sub>Q</sub>	150	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	7∄	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
1 + 1 × 1	#20		P.F.	PLANARITY, INFILLING MATERIAL AND	Æ	AND ROCK MASS	SMOOTHNESS, CAVING ROD
SCIE		S. O	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-32.6	75.0				+ -	Limestone	
02.0	R1-NQ		0			- 75.0-76.3' - dusky yellow, (5Y 6/4),	_
	1.5 ft	73			ш	very fine to fine grained, moderate to	R1: Run time not recorded
-	73%		1	76 15' Fracture or hadding plans, harizantal	Ь	strong HCl reaction, weak (R2),	Driller's Remark: Rig
-	76.5		NR)	76.15' - Fracture or bedding plane, horizontal, rough, undulating, open, loose	-	- \ voids (1/16") over 15% of surface,	chatter at 76.0'
I _				Tough, undulating, open, loose	1	<1/16" thick laminations at	_
						76.0-76.1', oval 3/8" fossil at 75.1'	Driller's Remark: Soft
-	1				1	No Recovery 76.3-76.5'	drilling, possible - unconsolidated material
-					1	No Recovery 76.5-81.5'	
_						_	_
	R2-NQ	•					
	5 ft 0%	0	NR		1	=	<u>-</u>
-	0 /0				1	-	-
80				_	4	_	
-37.6							
1 -	1				1	_	R2: Run time not recorded
-					1	-	-
-	81.5				1		-
						No Recovery 81.5-86.5'	
					1	_	_
-					1	-	-
-					4	_	-
l _							_
	R3-NQ						
-	5 ft	0	NR		1	-	-
-	0%				-	_	-
85					_		
-42.6							
-					1	F	R3: Run time not recorded
-					1	-	Switch back to SPT
-	86.5						sampling at 86.5', blind drill -
						No Sample 86.5-88.0'	without sampling from
_					1	-	86.5-88.0'
1 -					1	-	-
1 -					1.	<u> </u>	
					H	Limestone Fragments	Split spoon sample SS-16
					1	-\ 88.0-88.2' - moderate yellowish brown, (10YR 5/4), fine grained, fine	advanced 88.0-88.4', 0.2' - recovery, N=50/5"
-					1	to coarse gravel-sized fragments,	Installed casing to 88.5'
1 -					1	- voids present on fragment surfaces	-
90_					1	No Sample 88.2-94.5'	
-47.6				_	1		_
1 -			0		1	-	-
1 -					-	_	-
					1		
1					1		·
1 -					1	-	-
1 -					1	_	-
					1		
1 -					1		l -
1 -					1	-	-
1 -					1	Limantona Francisco	Culit anger
1	94.5				╨	Limestone Fragments	Split spoon sample SS-17 advanced 94.5-94.7', 0.1'
95					ш	<ul> <li>94.5-94.6' - coarse grained sand-size rock fragments recovered</li> </ul>	recovery, N=50/2"
35_					1	100K Haginoria 1000vorca	10007019, 14 00/2
					1		
			l		1		l .



PROJECT NUMBER:

33884.FL

BORING NUMBER:

B-26

SHEET 6 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723010.2 N, 458111.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS : 4.4	11 ft b	gs on	3/06/07 START : 2/21/2007 END : 2/	<u> </u>	D7 LOGGER : C. LeBlanc	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACING
HH	RUI. VER	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	S	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
THE STATE	JRE NG CO	ØΒ	AC.	PLANARITY, INFILLING MATERIAL AND	ΜB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	8 8 8	ď		THICKNESS, SURFACE STAINING, AND TIGHTNESS	Sγ	CHARACTERISTICS	BROTO, TEOT REGULTO, ETC.
-52.6	R4-NQ	50	>10	94.8, 94.9' - Fracture, 10 deg, rough,	Ш	<b>Limestone</b> - 94.5-94.9' - yellowish gray, (5Y 7/2),	Resume rock coring at 94.5'
	2 ft 85%	50	NR	undulating, open 94.9-95.85' - Fracture zone, angular to	Ш	fine grained, moderate HCl reaction,	R4: 4 minutes
-	96.5		1	subangular fragments	Н	extremely weak to very weak (R0 to	1
-	30.5			96.5' - Mechanical break, 50 deg	Ħ	<ul> <li>R1), no voids</li> <li>No Recovery 94.9-95.2'</li> </ul>	Because of fracture
-			1	96.95' - Mechanical break		Limestone	surface at bottom end of core R4 matching top end
-				97.3' - Fracture, 65 deg, smooth, undulating,	ш	- 95.2-96.5' - moderate yellowish	of core R5, core loss for
-			1	tight	ш	brown, (10YR 5/4), moderate HCl reaction, weak to medium strong (R2	R4 is interpreted to be -
-	R5-NQ			98.15' - Fracture, 50 deg, rough, undulating	Н	<ul> <li>to R3), begins in fracture zone with</li> </ul>	within fracture zone at 94.9'
_	5 ft	24	3	98.8, 99.3, 99.8, 100.4, 100.7, 101.1' -		many deep cavities, below 95.8' voids increase from 0% to 20%,	-
_	94%			Fractures (6), 60-80 deg, rough, undulating,	Ш	cavities up to 1" at 95.2'	_
100_			2	significant fragmentation throughout, fragments 1/2"-3", elongate to angular	ш	96.5-98.4' - moderate yellowish	
-57.6				99.4' - Fracture, horizontal, rough, stepped,	Ш	brown, (10YR 5/4), fine grained, moderate HCl reaction, medium	]
			2	open	Н	strong (R3), 15-20% fine voids	R5: Run time not recorded
I -	101.5		NR		H	(1/16"), few small (1/4") cavities/fossils	1
-				101.5-102.0' - Fracture zone, subangular	Ш	98.4-99.3' - moderate yellowish	1
-			>10	rock fragments 1/2"-2"	ш	brown interbedded with yellowish	1
-				102.35' - Fracture, 80 deg, smooth,	ш	<ul> <li>gray, (10YR 5/4 with 5Y 7/2),</li> <li>moderate to strong HCl reaction,</li> </ul>	1
-			>10	undulating, terminates above at fracture zone 102.8' - Fracture, 30 deg, smooth, undulating	Н	very weak to medium strong (R1 to	1
-	R6-NQ			103.0-103.3' - Fractures (3), vertical, rough,	H	R3) 99.3-99.5' - yellowish gray, (5Y 7/2),	-
-	5 ft	7	>10	undulating, fragmented 103.3-104.5' - Fracture zone, rock fragments	Н	strong HCl reaction, very weak (R1)	-
-	60%			from silt-size to 2", friable	ш	99.5-101.2' - yellowish gray to dusky	-
105				_	$\Box$	yellow, (5Y 7/2 to 5Y 6/4), fine grained, strong (R4), voids (<1/16")	
-62.6			NR		Н	_ 0-10% (intermittently), several	
_				_	H	1/4"-1/2" cavities and spiral fossil  molds	R6: 8 minutes
	106.5				Ш	No Recovery 101.2-101.5'	
			,		Ш	Limestone	
-			2	106.85' - Fracture, 55 deg, rough, stepped, open with small fragments	ш	<ul> <li>101.5-102.0' - Same as 99.5-101.2' except fragmented</li> </ul>	1
-				107.15, 107.7' - Fractures (2), 25 deg, rough,	Н	102.0-103.3' - Same as 99.5-101.2'	1
-			3	undulating, fragmented, particularly at 107.15'	Ħ	<ul> <li>except medium strong (R3), core intact until 102.8', several 1/4"-1/2"</li> </ul>	1 1
-	R7-NQ			107.15 107.85, 107.95' - Fractures, 10 deg, rough,	H	cavities and molds	1 +
-	5 ft	64	2	undulating, tight to open	Ш	- 103.3-104.5' - Same as 99.5-101.2'	-
-	89%			108.75' - Fracture or mechanical break, 50 deg, healed	ш	except extremely weak to very weak (R0 to R1), friable	1 -
110_ -67.6			2	109.25' - Fracture, horizontal, rough, —	$\vdash\vdash$	— No Recovery 104.5-106.5'	
"-				undulating to planar, open 109.7' - Fracture, 30 deg, smooth, undulating,	Ħ	Limestone 106.5-106.8' - moderate yellowish	P7: 5 minutes
-			1	tight with missing fragments	Н	<ul> <li>brown to moderate olive brown,</li> </ul>	R7: 5 minutes
_	111.5		NR	109.95' - Fracture, 75 deg, rough, undulating,	Ш	(10YR 5/4 to 5Y 4/4), fine grained,	
I _			3	weathered, with slight infill 110.7' - Fracture, horizontal, rough, stepped	Ш	moderate HCl reaction, weak to medium strong (R2 to R3), fine	]
			Ľ	to undulating	Н	(1/16") voids over 10-25% (variably),	SC-1 collected 112.0-
I -				111.75' - Fracture, 80 deg, rough, stepped, second half of fracture is fragmented into	H	many 1/4" elongated cavities _ 106.8-107.3' - Same as 106.5-106.8'	112.95' -
-			2	angular 1"-2" pieces	Ш	except extremely weak to very weak	1
-	R8-NQ			112.0' - Fracture, 50 deg, smooth, undulating	Ш	(R0 to R1), friable	1
-	5 ft 100%	64	3	112.95' - Fracture, horizontal, rough, planar 113.15' - Fracture, 60 deg, smooth, stepped,	Ш	_ 107.3-109.25' - Same as 106.5-106.8'	1
	100%			tight, with weathered edges	$\vdash\vdash\vdash$	109.25-109.7' - Same as	1 +
115				_	H	106.5-106.8' except very weak (R1)	_
							i .



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-26	SHEET	7	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723010.2 N, 458111.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

<u>WATE</u> R	LEVELS: 4.4	1 ft b	gs on 3	3/06/07 START : 2/21/2007 END : 2/2	23/20	D7 LOGGER : C. LeBlanc	
>ດ≎	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-72.6	0	_	1	113.7' - Fracture, horizontal, rough, planar,		109.7-110.95" - Same as	
- -	116.5		3	tight, with weathered edges 113.9' - Fracture or mechanical break, 70 deg, rough, undulating, healed 114.35' - Fracture, horizontal, planar to		<ul> <li>106.5-106.8'</li> <li>No Recovery 110.95-111.5'</li> <li>Limestone</li> <li>111.5-116.5' - dusky yellow to</li> </ul>	R8: 5 minutes
-			>10	slightly undulating 115.3' - Fracture, 70 deg, rough, undulating, 5/16" relief, terminates at a rough stepped -		moderate yellowish brown, (5Y 6/4 to 10YR 5/4), fine grained, moderate HCl reaction, weak (R2), 20% fine	
-			1	fracture at 115.65', tight 115.9' - Fracture, 70 deg, rough, undulating, tight, weathered	Ħ	(1/16") voids, few cavities up to 1/4" 116.5-116.7' - Same as 111.5-116.5' - except medium strong (R3), with	SC-2 collected 118.0- 118.97'
-	R9-NQ 5 ft 72%	19	2	116.45' - Fracture, horizontal, rough, undulating, 1/8" relief 116.7-117.0' - Fracture zone, subrounded -	Ħ	some weaker zones and rock fragments 116.7-117.0' - Same as 111.5-116.5'	
120_ -77.6			1	rock fragments 1/2"-2" 117.45' - Fracture, 10 deg, rough, undulating, tight, cuts across 80 deg fracture at 117.65'		except fragmented 117.0-119.2' - Same as 111.5-116.5' except medium strong (R3), with	-
-	121.5		NR	117.65' - Fracture, 80 deg, rough, undulating, 10 inches long, black staining (pyrite), tight, weathered		some weaker zones and rock fragments _ 119.2-120.1' - Same as 111.5-116.5'	R9: 5 minutes
-			0	118.0' - Fracture, 25 deg, smooth, stepped, voids and molds on fracture surface 118.97' - Fracture, 10 deg, rough, undulating,		except no to mild HCl reaction, very weak to weak (R1 to R2), sections of increased voids	
-			>10	white crystalline infill, trace 1/16" voids on surface 119.20' - Fracture, 10 deg, rough, stepped,		No Recovery 120.1-121.5' Limestone 121.5-122.5' - dusky yellow to	
-	R10-NQ 5 ft 58%	19	>10	open, friable, infilling, increased voids 120.8' - Fracture, horizontal, rough, undulating		moderate yellowish brown, (5Y 6/4 to 10YR 5/4), fine grained, moderate to strong HCl reaction, medium strong	
125_ -82.6 -	126.5		NR	122.5' - Fracture, 15 deg, rough, undulating, tight but weathered and friable — 122.7' - Fracture, 25 deg, smooth, stepped, top of fracture zone 122.7-122.9' - Fracture zone, subangular 1" fragments		(R3), small (1/16") voids over 20-25%, fossiliferous (numerous molds/casts, small [1/4"] circular/oval voids, larger [1"] thin elongate cavities) 122.5-122.85' - Same as	R10: Run time not recorded
-			>10	123.15, 123.4' - Fractures or bedding plane, 0-10 deg, rough, planar, tight, some fragmentation		121.5-122.5' except very weak to weak (R1 to R2), secondary infilling of cavities, more friable	
-			>10	123.25' - Fracture, 80 deg, rough, planar, tight, angular 123.66' - Fracture, 20 deg, rough, undulating,	Ħ	122.85-123.7' - Same as 121.5-122.5' except 5% coverage of voids (1/16"), no fossils or cavities,	
-	R11-NQ 5 ft 78%	42	1	top of unconsolidated zone 124.15' - Fracture, 10 deg, rough, undulating, bottom of unconsolidated zone		elongate molds 1/16" wide, sharp angular breaks Silty Sand (SM)	SC-3 collected 128.9- 129.92'
130_ -87.6			0	124.25' - Fracture, 70 deg, rough, undulating 126.8' - Fracture, 10 deg, rough, stepped, — infilled	Ħ	123.7-124.15' - dark yellowish orange, (10YR 6/6), wet, fine grained, nonplastic, mild HCl	-
-	131.5		NR	126.8-127.9' - Fracture zone, no clear contacts, some vertical fractures at depth within zone		reaction, 10% coarse sand-sized, 30% nonplastic fines, 10% fine gravel-size material, small fossil	R11: 5 minutes
-			>10	127.9' - Fracture, horizontal, rough, undulating, open 128.05' - Fractures (2), horizontal and 30		fragments, all calcareous material  Limestone 124.15-124.4' - Same as	
-			>10	deg, rough, undulating, tight to open, fit together, weathered, slight infill 128.50' - Fracture, 20 deg, rough, undulating		122.85-123.7' except weak (R2)  No Recovery 124.4-126.5'	
- -	R12-NQ 5 ft 42%	8		128.92' - Fracture, 10 deg, smooth, undulating 131.6-131.8' - Fracture zone, with angular fragments 1/2"-2" in size, bounded by rough		-	
135				and undulating horizontal fractures	H		

ORIENTATION : Vertical



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338884.FL	B-26	SHEET	8	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723010.2 N, 458111.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS: 4.4	1 ft bo	gs on :	3/06/07 START : 2/21/2007 END : 2/	/23/2	200	7 LOGGER : C. LeBlanc	
≥∩≘	(9)			DISCONTINUITIES	بِ	<u>ي</u>	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H B	E RU STH, OVEF	D (%)	TUF FOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	2	3CL	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP- SURI ELE\	COR	RQI	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	N	S.Y.W	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-92.6			NR	132.05, 132.2, 132.45' - Fractures (3), 0-10	$\dagger$		Limestone	
-				deg, rough, undulating to stepped, open, increasing voids with depth	ħ	f	<ul> <li>126.5-126.8' - moderate yellowish brown to moderate olive brown,</li> </ul>	R12: 6 minutes
-	126 5			132.85' - Fracture, horizontal, rough, stepped	Б	7	(10YR 5/4 to 5Y 4/4), fine grained,	-
-	136.5			to planar, open, cavity at break 133.15' - Fracture, 10 deg, rough, undulating,	E	#	- moderate HCl reaction, weak (R2), 5-20% coverage of voids (1/16"), with	-
-			>10	soft, very weak rock material at fracture face,	世	Ⅎ	infill of silty sand material similar to	-
-				followed by rock fragments 133.15-133.60' - Fracture zone, angular rock	₽	H	- 123.7-124.15' 126.8-130.4' - Same as 126.5-126.8'	-
-			3	fragments 1/2"-2" with horizontal fractures	卩	Ц	except weak to medium strong (R2 to	-
-	R13-NQ			within zone at 133.25' and 133.4' 136.55, 136.6' - Fracture (2), horizontal,	乜	□	- R3), no infill No Recovery 130.4-131.5'	-
-	5 ft 62%	28	4	smooth, planar, along bedding planes	$^{\dagger}$	ф	Limestone	-
140	02/0			136.8 137.05, 137.2, 137.35' - Fractures (4), 0-10 deg, smooth, planar, fragmentation	+	$\dashv$	- 131.5-132.2' - moderate yellowish brown to moderate olive brown,	-
140 <u> </u>				between fractures, slight infill, some black	占	7	(10YR 5/4 to 5Y 4/4), fine grained,	_
-			NR	staining 137.6' - Fracture, horizontal, rough,	七	⇉	moderate HCl reaction, strong (R4), 20% fine (1/16") voids, elongate	R13: Run time not
-	141 5			undulating to stepped, open	ť	Н	fossil molds 1/4"x1/2"	recorded -
-	141.5			138.0, 138.4, 138.55' - Fractures (3), 20-40 deg, rough, undulating, tight to open with	₽	Н	132.2-132.9' - Same as 131.5-132.2' except 30% voids (up to 1/8"), more	-
-			3	weathering at fractures	乜		fossiliferous with larger cavities	-
-				139.1' - Fracture, 40 deg, rough, stepped, no matching face beneath	口	П	132.9-133.6' - Same as 131.5-132.2' except grading to light olive gray, (5Y	-
-			3	139.1' - Fracture, horizontal, rough, planar	Ь	Н	5/2), 0-15% voids	-
-	l R14-NQ			139.6' - Mechanical break, 10 deg 141.85' - Fracture, horizontal, rough,	H	$\dashv$	No Recovery 133.6-136.5' Limestone	-
-	5 ft 69%	25	6	stepped, open	T	7	136.5-137.6' - light olive gray grading	-
145	0970		3	142.25' - Fracture, 10 deg, smooth, undulating, open, with color change starting	Ľ	Ⅎ	to light olive brown with depth, (5Y 5/2 to 5Y 5/6), very fine grained,	-
-102.6				at 141.95' and noticeable at 142.25'	╆	ᅡ	moderate HCl reaction, medium strong to strong (R3 to R4), <5%	_
-			NR	142.45' - Fracture or mechanical break, 40 deg, rough, planar, healed	卩	Ц	voids, laminated bedding, white	R14: 5 minutes
_	146.5			142.6' - Fracture, smooth, undulating, open and weathered/rounded faces coated with	口		recrystallization infilling 137.6-139.1' - light olive gray to	-
-	140.5			lighter colored film of infill	巾		moderate yellowish brown, (5Y 5/2 to	-
-			4	143' - Fracture, 20 deg, smooth, undulating, 3/4" cavity, weathered, subangular	ħ	f	<ul> <li>10YR 5/4), fine grained, moderate to strong HCl reaction, weak to medium</li> </ul>	-
-				143.5' - Fracture, 20 deg, rough, undulating,	F	7	strong (R2 to R3), 5-25% voids	-
-			4	tight 143.55, 143.8, 143.95, 144.2, 144.4, 144.8' -	Ґ	#	<ul> <li>(1/16"), horizontal bedding and 0-5% voids at 138.5-139.1', few cavities up</li> </ul>	
-	R15-NQ		2	Fractures (6), 0-25 deg, rough, undulating to	世	Ⅎ	to 1/2", some dark infilling	
-	5 ft 48%	9		stepped, less weathered and rounded than at 143.0', subangular fragments at all fractures,	ť	ᅡ	- 139.1-139.6' - moderate yellowish brown, (10YR 5/4), fine grained,	
150	70/0			all open, some fragments between fractures	P	4	moderate to strong HCl reaction,	
-107.6			NR	146.6' - Fracture, horizontal, rough, planar, — staining on upper face only	乜	口	<ul><li>weak to medium strong (R2 to R3),</li><li>5-10% fine (1/16") voids, some</li></ul>	-
-				146.7' - Fracture or mechanical break,	巾	╣	organic infilling	R15: Run time not
-	151.5			vertical, smooth, planar, healed, terminates at fractures at 146.6' and 146.5'	Ь	┰╂	No Recovery 139.6-141.5' Limestone	recorded -
-	101.0			146.8' - Fracture, horizontal, rough, stepped	T	7	7 141.5-141.95' - moderate yellowish	End of Boring at 151.5' on
-				to planar, voids visible on fracture face 147.3, 147.6, 147.75, 148.3' - Fractures (4),	1	ŀ	brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2),	2/23/07 -
-				0-10 deg, rough, planar, tight with some	1	ŀ	10% fine (1/16") voids, several	
-				minor fragmentation, angular breaks 147.7' - Fracture, 80 deg, rough, planar,	1	ŀ	elongate (1/4"x1") cavities and 1/4" round cavities, light gray infilling of	
-				terminated by fracture at 147.3', missing second half	1	ŀ	some cavities, 1/8" thick black	
_				148.45' - Fracture, 70 deg, rough, planar	1	f	lanimations at top	
-				148.6, 148.7' - Fractures (2), horizontal, undulating, open, weathered	1	ŀ	-	
_				windulating, open, weathered	1	T		
					L			



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-26	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723010.2 N, 458111.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

				12141 : CIVIE 330 3/14 100073, Illud Totally,	110 100.0, 1111	,,,,,,,	9	ONENTATION: Vertical
WATER	LEVELS: 4.4	11 ft bo	as on S	3/06/07 START : 2/21/2007	END : 2/2	3/20	07 LOGGER : C. LeBlanc	
				DISCONTINUITIES			LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)					SYMBOLIC LOG	LITIOLOGI	CONNIVILIATO
OAS.	ŽŽ≻		FRACTURES PER FOOT	DESCRIPTION		ij	ROCK TYPE, COLOR,	OIZE AND DEDTH OF GAGING
ᆱ႘힏	₹, H	9	JR.			吕	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
∓¥₹	SEE	(%) О	J.G	DEPTH, TYPE, ORIENTATION, ROL	JGHNESS,	<u>8</u>	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
문문년	22.22	Ø	ZAC ER	PLANARITY, INFILLING MATERIA	AL AND	₹	AND ROCK MASS	DROPS, TEST RESULTS, ETC.
E S E	222	ď	FE	THICKNESS, SURFACE STAINING, ANI	D HIGHTNESS	S	CHARACTERISTICS	
							141.95-144.95' - yellowish gray, (5Y	
l –					_		- 7/2), very fine to fine grained, strong	
							HCl reaction, strong (R4), 5-15% fine	
I -					-		(1/16") voids, many 1/4"-1/2" cavities,	1
I _					_		often infilled with weaker rock,	_
							increased voids and more	
-					-		resemblance to rock at 141.5-141.95'	-
							- at 144.8-144.9' (possible start of	
I 7					_		transition sequence)	
-					-		No Recovery 144.95-146.5'	-
							Limestone	
					=		146.5-148.6' - repeated transitions	1
-					-		from dusky yellow to light olive gray	-
							or light olive brown, (5Y 6/4 to 5Y 5/2	
1 7					-		or 5Y 5/6), very fine to fine grained,	1
-					_		moderate to strong HCl reaction,	
							strong (R4), <3% voids (1/16") but	
1 7					-		with increased voids at 146.5-146.6'	1
-					-		(5%), 148.1-148.2' (10%), and	-
							148.6-148.9' (40%)	
I -					-		148.6-148.9' - Same as	1
l –					_		141.5-141.95' except darker brown	_
							color, increased voids	
_					-		No Recovery 148.9-151.5'	1
_					_		Bottom of Boring at 151.5 ft bgs on	
-					-		_ 2/23/2007	-
I -					_		_	_
_					-		-	1
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-27	SHEET	1 (	)F	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722971.1 N, 458154.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit

WATER	LEVELS	: 4.41 ft k	ogs on 3/0	06/07	START : 2/8/2007 END : 2/10/2007	LOGGER	: A.	Teal
				STANDARD	SOIL DESCRIPTION		G	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	l l			PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLO		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY	OR	BOLI	DRILLING FLUID LOSS, TESTS, AND
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERAL	-OGY	SYM	INSTRUMENTATION
42.4				(. 1)				"Water level is based on Ground Water
-						-		Monitoring at LNP site (FSAR Table - 2.4.12.08)"
-						-		
-						1		
								Water levels not recorded during drilling
_								_
_						=		_
-						-		_
_	4.5				Poorly Graded Sand With Silt (SP-SM)		T!T	SS-1: Weight of hammer drove split spoon
5 37.4		10	00.1	1-1-0	4.5-5.5' - moderate vellowish brown, (10YR 5/4	l), wet, —	拼	the last 6"
-		1.0	SS-1	(1)	very loose, very fine to fine grained, 10-15% nonplastic fines, silica sand, 10-12% organics	/-	111	-
-	6.0				(verpraeur mee, emea ema, veria pergamee			-
-						-		-
-						-		-
-						-		-
-						=		_
						]		
	9.5							
10				0-0-0	Silty Sand (SM)  9.5-9.8' - very pale orange, (10YR 8/2), very we		111	
32.4		0.3	SS-2	(0)	soft, very fine to medium grained, strong HCl re 30% low to medium plastic fines, silica and car	eaction, /		SS-2: Weight of hammer drove split spoon 18", sample may be slough
-	11.0				sands, 5-10% organics	bonate   -		-
-								-
-						-		-
-						=		-
-						+		-
-						-		-
-	14.5					1		-
15					Silty Sand With Limestone Fragments (SM) 14.4-15.5' - white to yellowish gray, (N9 to 5GY	( 0/0)	П	]
27.4		1.0	SS-3	10-17-9 (26)	wet, medium dense, very strong HCl reaction, 4	40%		
_	16.0			( - /	fine to coarse gravel, 20% low to medium plast fines, all carbonate materials	tic / ]		_
-					(moo, an oarsonate materiale			_
-						-		-
-								_
-						-		-
-						-		-
-	19.5					+		-
20	13.3						Ш	-
1	ı	ı	l					

ORIENTATION : Vertical



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-27	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722971.1 N, 458154.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

WATER	LEVELS	: 4.41 ft k	ogs on 3/0	06/07	START : 2/8/2007 END : 2/10/2007 LOGGER : A. Teal
				STANDARD	SOIL DESCRIPTION 5 COMMENTS
AND AND (#)	SAMPLE INTERVAL (ft)  RECOVERY (ft)  RECOVERY (ft)  #TYPE  6"-6"-6"  (N)				SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE ATIO		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR  BETH OF CASING, BRILLING RATE,  DRILLING FLUID LOSS, TESTS, AND
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
22.4		0.8	SS-4	11-7-20	Silt (ML)
-	21.0			(27)	19.5-20.25' - very pale orange, (10YR 8/2), wet, very /- stiff, nonplastic, very rapid dilatancy, moderate HCl
-					reaction, 5-10% very fine to fine grained sand
1 ]					]
-					] ]
-					_
_	-				_
-	-				-
	24.5				Silt With Sand And Limestone Fragments (ML)
25 <u> </u>		0.8	SS-5	39-18-14	■ 24.5-25.3' - Same as 19.5-20.25' except 15% very ■
-	200	0.0	33-3	(32)	fine to medium grained, 20% fine gravel-sized /-
-	26.0				-
-	-				1 1
-	1				1 1
_					1
					]
-					
-	29.5				CHARLE A LAND
30 12.4		1.3	SS-6	18-29-50/3	Silt With Sand (ML) 29.5-30.8' - Same as 24.5-25.3' except moderate —
12.4	30.8	1.3	33-0	(79/9")	yellowish brown, (10YR 5/4), moist to wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl
-	- 00.0				\ reaction, trace fine gravel, 20-25% very fine to \ /-
-					\medium grained sand, all carbonate materials \  \ \_
-					-
-	-				1 1
-	-				1 1
-					1
	34.5				
35				04 40 00	Silty Sand (SM) 34.5-35.6' - moderate olive brown, (5Y 4/4), wet,
7.4		1.1	SS-7	31-18-22 (40)	dense, very fine to coarse grained, mild HCl reaction.
-	36.0			` ,	10-15% fine gravel, 20-25% low plastic fines, all carbonate materials
-					
-					
-					
-	-				
-	1				
-	39.5				
40	39.8	0.1	SS-8	50/3	<u> </u>
1.,					
1	1				1



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	B-27	CHEET	3 OF 0

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722971.1 N, 458154.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

WATER	LEVELS	: 4.41 ft k	ogs on 3/0	06/07	START : 2/8/2007 END : 2/10/2007 LOGGE	: A. Teal						
				STANDARD	SOIL DESCRIPTION		G	COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LICCS OPOLID SYMPOL COLOR		SYMBOLIC LOG	DEDTH OF CASING POILLING DATE				
H BE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		30 Li	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND				
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTÁTION				
2.4				(50/3")	Limestone Fragments	十						
-					\(\)\(\)39.5-39.6' - light olive gray, (5Y 5/2), mild HCI reaction, poor recovery	1		_				
-					, , , , , , , , , , , , , , , , , , , ,	1		_				
						]						
_						1		_				
_						4		_				
-	44.5 44.6	0.0	\ SS-9 /	50/1		4						
-	44.6		(300)	(50/1")	—\44.5-44.6' - Same as 39.5-39.6' except poor recovery // // // // // // // // // // // // //	$\mathcal{A}$		Encountered rock from 37.0-46.0' switched to NQ coring				
45_					Begin Rock Coring at 44.0 ft bgs See the next sheet for the rock core log	1		Terminate soil sampling at 44.6' Set 35.0' NW casing				
-2.6					·	1						
-						1						
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-27	SHEET	4	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722971.1 N, 458154.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS : 4.4	1 ft b	gs on	3/06/07 START : 2/8/2007 END : 2/	10/20	00	7 LOGGER : A. Teal	
≥∩≘	(9)			DISCONTINUITIES	ပ္ခ	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ſ	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE	E RU STH, SVEF	(%) O	F.S.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	SOR! ENC	ROI	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME		AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	44.0			44.1' - Fracture, 10 deg, smooth, undulating,	- U	+	Limestone	
45 -	R1-NQ		2	open	$\vdash$	╁	44.0-45.1' - light olive gray, (5Y 5/2),	-
45 -2.6	2 ft 85%	45		44.2' - Fracture, 20 deg, smooth, undulating, — open	惼	₽	_ fine grained, moderate HCl reaction, ¬ weak (R2), voids <1/16" on 50% of	R1: 13 minutes —
-			1	45.1' - Fracture, 5 deg, smooth, undulating,	$\parallel \parallel \parallel$	l	surface, trace voids to 3/16"	18:06 End day 2/8/07 at
-	46.0		NR	sandy infilling, open	Ш	1	Silt (ML)  45.1-45.7' - moderate olive brown,	46.0'
_			2	46.25' - Fracture, 50 deg, rough, planar 46.5' - Fracture, 20 deg, rough, undulating	Ш	T	(5Y 4/4), wet, stiff, moderate HCl reaction, trace fine sand	-
-			_	, , , , , , , , , , , , , , , , , , , ,	1111	lt	No Recovery 45.7-46.0'	-
-			0	-	1111	l	Limestone 46.0-46.5' - moderate olive brown,	-
-	R2-NQ				1		(5Y 4/4), fine grained, moderate to	1
-	5 ft 66%	0	0		1		strong HCl reaction, weak (R2), voids <1/16" on 40% of surface,	_
			0				moderately fossiliferous (molds to	
50_							3/16") <b>Silt (ML)</b>	
-7.6			NR		1111	L	46.5-49.3' - Same as 45.1-45.7'	R2: 7 minutes
_	51.0			_	Ш		except trace limestone fragments to	
l _			5	51.25' - Fracture, 5 deg, smooth, undulating	H	┨	No Recovery 49.3-51.0'	Section appears competent but breaks into sandy silt -
_				51.3' - Fracture, 15 deg, smooth, undulating 51.8' - Fracture, 10 deg, rough, undulating	₽	┨	<b>Limestone</b> 51.0-52.5' - moderate olive brown,	sized particles when _
_			1	52.0' - Fracture, 25 deg, smooth, undulating,	oxdot	1	(5Y 4/4), fine grained, strong HCl reaction, extremely weak (R0), trace	pushed on with 2 fingers -
-	D0 N0			tight	╆	1	organics, friable	-
-	R3-NQ 5 ft	43	0	53.35, 53.8' - Mechanical break (2)	口	┇	52.5-54.7' - moderate yellowish brown, (10YR 5/4), fine grained,	-
-	97%				士	╁	moderate HCl reaction, very weak to	-
-			0		士	Ŧ	weak (R1 to R2), voids <1/16" on 40% of surface, trace voids to 3/16"	-
55 <u> </u>				_	$\  \ $	l	(fossils) on <5% of surface, trace	R3: 4 minutes
-			0	-	$\  \ $	l	organics Silt (ML)	-
-	56.0		NR.	-	Ш	1	54.7-55.85' - moderate yellowish brown, (10YR 5/4), moderate to	-
-			>10		╁	ł	strong HCI reaction, trace limestone	-
-				56.9, 57.3, 57.4' - Mechanical break	F	╂	fragments to 1/16"  No Recovery 55.85-56.0'	-
-			>10		Ħ	1	Limestone	-
-	R4-NQ				Ħ	Ť	56.0-56.7' - moderate yellowish brown, (10YR 5/4), fine grained,	1
-	5 ft 100%	46	1	58.75' - Fracture, 60 deg, rough, undulating,	Ħ	Ī	moderate HCl reaction, extremely	1
			_	1/8" clay infilling		1	weak to very weak (R0 to R1), 56.4-56.7' extremely weak (R0) zone	
60_			5	59.1' - Fracture, horizontal, smooth, undulating, 1/8" clay infilling	Н	1	56.7-61.0' - moderate yellowish — brown, (10YR 5/4), fine grained,	
-17.6			0	59.1-59.5' - Fracture, 80 deg, rough, planar,	oxdot	1	moderate HCl reaction, weak (R2),	R4: 5 minutes
_	61.0			open 59.3' - Fracture, 10 deg, smooth, undulating,	尸	1	voids <1/16" on 50% of surface in two zones from 58.2-61.0', trace	
-			4	open 59.5' - Fracture, 5 deg, smooth, undulating,	口	1	voids to 3/8" are <5% of surface on	]
_				open .	口	1	58.2-61.0', zones of very weak rock 57.3-57.8' and 58.8-59.3', moderately	]
-			1	59.6' - Fracture, 50 deg, rough, undulating, open	上	Ⅎ	fossiliferous (molds) below 60.0'	_
-	DE NO			60.35' - Mechanical break	一	╀		
-	R5-NQ 5 ft	71	1	60.8' - Mechanical break 61.5' - Fracture, 10 deg, rough, undulating,	F	7		-
	88%			20% coverage clay infilling, tight	F	╀		
						ĺ		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	B-27	SHEET	5	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722971.1 N, 458154.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

DEPTH, TYPE, ORIENTATION, ROUGHNESS, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS  61.75, 62.0' - Mechanical break 62.3' - Fracture, 20 deg, smooth, undulating, 15% coverage clay infilling, open to 3/8"  DEPTH, TYPE, ORIENTATION, ROUGHNESS, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  FLUID LC SMOOD DROPS  61.0-65.4' - moderate yellowish brown, (10YR 5/4), fine grained,	COMMENTS  AND DEPTH OF CASING, LOSS, CORING RATE AND DOTHNESS, CAVING ROD PS, TEST RESULTS, ETC.
DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  CHARACTERISTICS  SIZE AL WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  CHARACTERI	AND DEPTH OF CASING, LOSS, CORING RATE AND IOTHNESS, CAVING ROD PS, TEST RESULTS, ETC.
65.22.6	LOSS, CORING RATE AND OTHNESS, CAVING ROD PS, TEST RESULTS, ETC.
65 - 22.6	LOSS, CORING RATE AND OTHNESS, CAVING ROD PS, TEST RESULTS, ETC.
65 - 22.6	OTHNESS, CAVING ROD PS, TEST RESULTS, ETC.
65 - 22.6	<u> </u>
65.22.6	2 minutes
65 -22.6	2 minutes - - -
-22.6  1 63.9' - Fracture, 5 deg, smooth, undulating, 10% coverage clay infilling, open 64.3' - Mechanical break 64.5' - Fracture, 40 deg, rough, undulating, 10% coverage clay infilling, open 64.7' - Fracture, 60 deg, rough, undulating, 10% coverage clay infilling, tight 64.7' - Fracture, 60 deg, rough, undulating, 10% coverage clay infilling, tight 70% coverage clay infilling, tight 10% coverage clay infilling, tight 70% coverage c	2 minutes
10% coverage clay infilling, open 64.3' - Mechanical break 64.5' - Fracture, 40 deg, rough, undulating, 10% coverage clay infilling, open 64.5' - Fracture, 40 deg, rough, undulating, 10% coverage clay infilling, tight 10% coverage clay infilling, tight 2 65.2' - Fracture, 20 deg, smooth, planar, clay  10% coverage clay infilling, open 61.0-63.0', voids <1/16" over 40% of same surface and over 10% of surface elsewhere, from 61.0-63.0' extremely fossiliferous on 61.0-63.0', voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous on 61.0-63.0', voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous on 61.0-63.0', voids <1/16" over 40% of surface and over 10% of extremely fossiliferous on 61.0-63.0', voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous on 61.0-63.0', voids <1/16" over 40% of surface and over 10% of extremely fossiliferous on 61.0-63.0', voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous on 61.0-63.0', voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous on 61.0-63.0', voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous on 61.0-63.0', voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous on 61.0-63.0', voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-63.0' extremely fossiliferous on 61.0-	z minutes - -
66.0 NR 64.3' - Mechanical break 64.5' - Fracture, 40 deg, rough, undulating, tight 64.7' - Fracture, 60 deg, rough, undulating, 10% coverage clay infilling, tight voids <1/16" over 40% of same surface and over 10% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of same surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of same surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of same surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of same surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of same surface and over 10% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of same surface and over 10% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of same surface and over 10% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/16" over 40% of surface els	-
64.5' - Fracture, 40 deg, rough, undulating, tight 54.7' - Fracture, 60 deg, rough, undulating, 10% coverage clay infilling, tight 2 65.2' - Fracture, 20 deg, smooth, planar, clay 56.2' - Fracture, 20 deg, smooth, planar, clay 56.2' - Fracture, 20 deg, smooth, planar, clay 56.2' - Fracture, 20 deg, smooth, planar, clay 56.2' - Fracture, 20 deg, smooth, planar, clay 56.2' - Fracture, 20 deg, smooth, planar, clay 56.2' - Fracture, 20 deg, smooth, planar, clay 56.2' - Fracture, 20 deg, smooth, planar, clay 56.2' - Fracture, 40 deg, rough, undulating, same surface and over 10% of surface elsewhere, from 61.0-63.0' extremely fossiliferous zones with voids <1/td>	1
64.7' - Fracture, 60 deg, rough, undulating, 10% coverage clay infilling, tight 2 65.2' - Fracture, 20 deg, smooth, planar, clay - molds and casts up to 3/8"x3/4" on	
10% coverage clay infilling, tight voids <1/1/16" on 40% of surface, 65.2' - Fracture, 20 deg, smooth, planar, clay molds and casts up to 3/8"x3/4" on	1
2   65.2' - Fracture, 20 deg, smooth, planar, clay - molds and casts up to 3/8"x3/4" on	-
infilling Fig. 5% of surface, trace organics	-
	_
R6-NQ 66.1' - Fracture, 10 deg, smooth, undulating, No Recovery 65.4-66.0' open Limestone	
- 5 ft   16   Open - Limestone   66.5' - Fracture, 15 deg, smooth, undulating, 66.0-67.7' - moderate yellowish	1
open brown, (10YR 5/4), fine grained,	7
NR 66.65' - Fracture, 5 deg, smooth, undulating, — moderate HCl reaction, very weak	+
70 open 66.8' - Fracture, 15 deg, smooth, undulating, (R1), voids <1/16" on 40 % of surface, trace voids to 3/16", trace	0
-27.6   66.8' - Fracture, 15 deg, smooth, undulating, surface, trace voids to 3/16", trace open open organics, 67.2-67.7' rock appears	2 minutes -
71.0 67.2' - Fracture, 25 deg, smooth, undulating, brecciated and more fossiliferous	
open open fewer voids and medium strong to strong rock (R3 to R4)	7
2 67.75' - Fracture, 10 deg, smooth, undulating, strong rock (R3 to R4) open No Recovery 67.7-71.0'	-
71.6' - Fracture, 20 deg, rough, undulating, Limestone	-
	_
72.1' - Fracture, 15 deg, rough, undulating, except voids <1/16" below 72.0' on open except voids <1/16" below 72.0' on 25% of surface, moderately	
72 1-73 3' - Fracture zone horizontal and fossiliferous	
62%   29   >10   vertical, rough, undulating, open, fragments	
from 3/8" to 4"	1
	-
10 deg rough undulating	minutes —
tight to open up to 9/16"	-
74.1' - Fracture, 30 deg, rough, undulating, open	
76 0-76 6' - Fracture zone, rough, undulating	
fragments 3/16" to 1-1/2"	Ī
70.6 - Practicle, 10 degr., following, undurating, 100 (10YR 5/4 to 10YR 6/2), fine grained,	7
7   1   77 1' - Fracture 30 deg rough undulating   moderate HCI reaction, medium	=
30% coverage clay infilling, open strong (R3), voids < 1/16 on 50% of	+
5 ft 48 1 1 25% by 79 0' trace voids to 3/16"	4
78.5' - Fracture, 10 deg, rough, undulating, moderately fossiliferous	
20-25% coverage day initialing	1
	1
-37.6 No Recovery 79.8-61.0	Lun time not recorded —
NR	7
81.0	
Limestone   SC-1 cc   SC-1 cc   S2.0'   81.0-85.4' - moderate yellowish   82.0'	collected at 81.0-
brown, (10YR 5/4), fine grained, mild	
HCI reaction, weak to medium strong	1
1 82.4' - Mechanical break - (R2 to R3), voids <1/16" on 20% of	†
surface, trace voids and fossil molds  R9-NQ surface, trace organics	-
5 ft 40 4 83.25' - Fracture, 60 deg, rough, planar, tight	-
88% to open up to 3/16"	_

ORIENTATION : Vertical



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-27	SHEET	6	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722971.1 N, 458154.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

<u>WATE</u> R	LEVELS: 4.4	1 ft bo	gs on (	3/06/07 START : 2/8/2007 END : 2/	10/20	D7 LOGGER : A. Teal	
				DISCONTINUITIES	ŋ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 85_ -42.6 -	86.0		4 2 NR	83.4' - Fracture, 20 deg, smooth, undulating, tight 83.65' - Fracture, 30 deg, rough, undulating, open 83.8' - Fracture, 20 deg, rough, undulating, open		- 	R9: Run time not recorded
- - - - - - 90 -47.6	R10-NQ 5 ft   94%	50	>10 >10 >10 0 >10 NR	84.0' - Fracture, 70 deg, rough, planar, tight 84.1' - Fracture, 10 deg, rough, undulating, open 84.5' - Fracture, 10 deg, rough, undulating, tight to open up to 3/16" 84.75' - Fracture, 50 deg, rough, undulating, open 85.0' - Fracture, 50 deg, rough, planar, tight 85.3' - Fracture, 50 deg, smooth, planar, open 86.65' - Fracture, 20 deg, rough, undulating, open 86.85-87.05, 87.4-87.5, 88.0-88.3, 90.4-90.7' - Fracture zone (4), rough, undulating, fine gravel sized limestone fragments		Limestone  86.0-86.8' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), trace voids <1/16", laminated subhorizontal bedding from 86.0-86.4'  86.8-87.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids <1/16" on 20% of surface  87.0-90.7' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, medium strong to	R10: Run time not recorded
- - - - - - 95	R11-NQ 5 ft 50%	27	>10	87.05-87.5' - Fracture (2), 45 deg and 80 deg, rough, undulating, open, tight-open respectively 91.0-92.2' - Fracture zone, 0-75 deg, rough, undulating, fragments 1/2"-2", trace bi-directional drill marks 92.4, 92.6' - Mechanical break (2)		strong (R3 to R4), zone of weak (R2) rock from 87.5-88.5', voids <1/16" on 25% of surface, trace voids to 3/16"x3/8", moderately fossiliferous No Recovery 90.7-91.0' Limestone 91.0-93.5' - Same as 87.0-90.7' No Recovery 93.5-96.0'	- - - - - -
-52. <del>6</del>	96.0			_	H	-	R11: Run time not recorded -
- - -			>10	96.0-96.3' - limestone fragments gravel to cobble sized 96.4' - Fracture, 10 deg, rough, undulating, open 96.7' - Fracture, 15 deg, rough, undulating, open		Limestone 96.0-99.3' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids <1/16" on 40% of surface, voids to 3/16" on 5% of	-
- 100 -57.6	R12-NQ 5 ft 66%	34	2 0 NR	97.0' - Fracture, 25 deg, rough, undulating, open 97.5' - Fracture, 10 deg, smooth, undulating 97.6' - Fracture, 50 deg, smooth, planar, tight 98.0' - Fracture, 15 deg, rough, undulating 98.2' - Fracture, 20 deg, rough, undulating, open		surface, cavities to 3/8"x3/4" from 96.0-97.3', moderately fossiliferous (casts, molds)  No Recovery 99.3-101.0'	R12: Run time not
- - -	101.0		3	99.3' - Fracture, 40 deg, smooth, planar  101.05' - Fracture, 40 deg, smooth, undulating, tight		Limestone 101.0-104.5' - Same as 96.0-99.3'	recorded -
-			2	101.3' - Fracture, 40 deg, smooth, planar, charcoal gray staining, tight 101.8' - Fracture, 35 deg, rough, undulating,		except weak (R2)	-
_	R13-NQ 5 ft 100%	68	1	open 102.4, 102.65' - Fracture (2), 40 deg, rough, undulating, tight 103.0' - Mechanical break			-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-27	SHEET	7	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722971.1 N, 458154.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS: 4.4	11 ft b	gs on 3	3/06/07 START : 2/8/2007 END : 2/	10/20	07 LOGGER : A. Teal	
<b>₹</b> □ <b>₽</b>	(%)			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
105 -62.6	106.0	ж_	4	103.5' - Fracture, 30 deg, rough, undulating, yellowish brown staining on 20% of surface, tight 103.6-103.9' - Fracture, 60 deg, rough, undulating, tight - 104.1' - Fracture, 25 deg, rough, undulating,		Limestone — 104.5-106.0' - pale yellowish brown, (10YR 6/2), fine grained, mild HCI reaction, very weak to weak (R1 to R2), voids <1/16" on 15% of surface,	SC-2 collected at 104.5- 105.45' — R13: 10 minutes
- - - - - 110	R14-NQ 5 ft 60%	24	>10 6 >10	charcoal gray staining, open to 3/16"  104.15' - Fracture, 60 deg, rough, planar, open to 1/16"  104.4' - Fracture, 15 deg, rough, undulating, charcoal gray staining, open to 3/8"  104.5' - Fracture, 50 deg, rough, planar, charcoal gray staining, tight  105.45, 105.7' - Fracture (2), 70 deg, rough, planar, charcoal gray staining, open  106.15' - Fracture, 50 deg, rough, planar, charcoal gray staining  106.15-106.5' - Fracture, 30 deg, rough,		trace fossil molds and casts to 3/16"  106.0-107.3' - Same as 104.5-106.0'  107.3 -109.0' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak (R2), voids  <1/16" on 25-30% of surface, trace fossil molds and casts to 3/8"x3/8" on <5% of surface  No Recovery 109.0-111.0'	
-67.6 _	111.0		NR	undulating, tight  106.15-106.5' - limestone fragments 2"x2"  107.0' - Fracture, 15 deg, rough, undulating, open	Ė	-	R14: 7 minutes
- - - - - 115	R15-NQ 5 ft i 55%	45	1 1 2 NR	107.2' - Fracture, 30 deg, rough, undulating, open 107.6' - Fracture, 30 deg, rough, undulating, open 108.3-108.8' - limestone fragments from 3/16" to 1"x2" 111.9' - Fracture, horizontal, rough, stepped 113.0' - Fracture, 5 deg, smooth, undulating, brown staining, tight 113.4-113.8' - Fracture zone, fragments to 1-1/2" subangular to subround		Limestone 111.0-111.9' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, medium strong (R3), voids <1/16" on 20% of surface, voids and fossil (casts, molds) to 3/8"x1" on 15% of surface, trace organics, at 111.3' clasts of gray limestone 1/4"x1" 111.9-113.75' - moderate olive brown with very pale orange and olive gray, (5Y 4/4 with 10YR 8/2 and 5Y 4/1),	Recovery loss assumed to be from bottom of run
-72.6 - - - -	116.0		5	116.1, 116.35, 116.85, 117.0, 117.1' - Fracture (5), horizontal and 5 deg, rough, undulating		fine grained, moderate HCl reaction, weak (R2), voids <1/16" on 15% of surface, fossil molds 1/16"x3/16"x3/4" 10% of surface, 2" band of olive gray (5Y 4/1) mottling at 113.2' No Recovery 113.75-116.0'	R15: Run time not recorded
- - -	R16-NQ 5 ft 76%	42	3	118.0-119.5' - Fracture zone or mechanical break (5)		Limestone 116.0-117.1' - dusky yellow, (5Y 6/4), fine grained, mild HCl reaction, weak (R2), voids <1/16" on 15% of surface, at 116.1' rock fragment dusky yellow with light olive gray (5Y 6/4 with 5Y 6/1) material	
-120_ -77.6 -	121.0		NR	121.0-126.0' - recovery too low to accurately		117.1-119.8' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 25% of surface, trace voids (fossil molds) from 3/16"-3/8" <5%, very weak to	R16: Run time not recorded
- - -	R17-NQ 5 ft	0	>10 NR	identify fracture depths -		weak (R1 to R2) rock zone from - 117.9-118.3' No Recovery 119.8-121.0' Limestone - 121.0-122.1' - Same as 117.1-119.8' No Recovery 122.1-126.0'	Low recovery
	22%				╫		

ORIENTATION : Vertical



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-27

SHEET 8 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722971.1 N, 458154.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS : 4.4	1 ft b	gs on 3	3/06/07 START : 2/8/2007 END : 2/	10/20	07 LOGGER : A. Teal	
				DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 125 -82.6 -	126.0		NR	-  -		-	R17: Run time not recorded -
- -			2	126.0-126.5' - Fracture zone  126.8' - Fracture, horizontal, rough, stepped, tight 127.1' - Fracture, 5 deg, rough, undulating, open		Limestone 126.0-126.8' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, medium strong (R3), voids <1/16" over 10% of surface, trace voids to 3/16"	- - -
- 130 -87.6	R18-NQ 5 ft 94%	32	0 2 0	127.4-127.9' - Fracture zone		126.8-127.7' - moderate yellowish brown, (10YR 5/4), fine grained, weak (R2), voids <1/16" over 20% of core, predominately oriented along laminated bedding planes, trace voids to 3/16" 127.7-130.7' - dusky yellow, (5Y 6/4), fine grained, mild HCI reaction, weak	Weaker rock at 129.0'  R18: Run time not recorded
- - - -	131.0 R19-NQ		3 4	131.5' - Fracture, 10 deg, rough, undulating, open - 131.7' - Fracture, 45 deg, rough, planar, open 131.75' - Fracture, 30 deg, rough, undulating, tight - 132.2, 132.5, 133.4' - Fracture, 20 deg,		to medium strong (R2 to R3), voids <1/16" on 25% of core, voids and fossil molds to 3/16"x3/8" on 5%, zone of very weak rock (R1) with laminar bedding from 129.1-129.8' No Recovery 130.7-131.0' Limestone 131.0-131.5' - Same as 127.7-130.7'	- - - -
- 135 <u>-</u> -92.6	5 ft 62% 136.0	26	>10 NR	rough, undulating, open 132.4, 132.75, 133.2' - Fracture, 10 deg, rough, undulating, open 133.7' - Fracture, 30 deg, rough, undulating 133.8-134.0' - Fracture zone, rough, undulating, fragments 3/16"-1"		except more fossiliferous with both gray and brown limestone fragments to 3/8"x3/4" 131.5-134.1' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, strong (R4), voids <1/16" on 10% of core, voids 3/8"x3/4" on 5%, light olive gray (5Y 6/1) mottling, moderately fossiliferous	R19: Run time not recorded
- - - -	R20-NQ 5 ft	16	2 0 >10	136.5' - Fracture, horizontal, smooth, planar, tight 136.7' - rough, undulating, open 136.8, 137.05, 137.37' - Mechanical break (3)		No Recovery 134.1-136.0' Silty Sand (SM) 136.0-136.5' - pale yellowish brown, (10YR 6/2), fine grained, 20% silt, poorly graded Limestone 136.5-138.0' - yellowish gray to pale	SC-3 collected at 137.15- 138.0' - Driller's Remark: Soft material at 138.0' -
140 -97.6	50%	10	NR	- - -		yellowish brown with yellowish brown,  (5Y 7/2 to 10YR 6/2), fine grained,  mild HCl reaction, strong (R4), laminated bedding, at 136.8' and  137.2', 136.8-137.2' moderate yellowish brown (10YR 5/4), voids <1/16" over 20% of surface	R20: 46 minutes
- - -	141.0		3	141.15' - Fracture, 5 deg, rough, undulating, open to 3/16" 141.5' - Fracture, 10 deg, rough, undulating, open to 1/4" 141.9' - Fracture, 15 deg, rough, undulating,		138.0-138.5' - moderate olive brown,     (5Y 4/4), fine grained, mild to     moderate HCl reaction, weak (R2),     trace voids <1/16" over <25% of     surface     No Recovery 138.5-141.0'	- - -
_	R21-NQ 5 ft 86%	60	1	open 142.0' - Fracture, 10 deg, rough, undulating, open to 1/8"		-	_



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-27	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722971.1 N, 458154.7 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

00.1	O IVIL II IOD 7	ND L	QUII IV	IENT : CME 550 S/N 186073, mud rotary, NQ tools, I	vvv casii	ng		ORIENTATION : Vertical
WATER	R LEVELS : 4.4	11 ft b	gs on	3/06/07 START : 2/8/2007 END	: 2/10/20	007	LOGGER : A. Teal	
				DISCONTINUITIES			LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	r	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
DEPTI SURF, ELEV	CORE	RQD	FRAC PER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNE 142.55' - Fracture, 30 deg, smooth, planar,	SS SYMB	_	AND ROCK MASS CHARACTERISTICS Limestone	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
145_ -102.6	-		5	open to 3/16" 143.3' - Fracture, 65 deg, rough, planar, 30% coverage brown staining, open to 3/16"		}	141.0-142.2' - Same as 138.0-138.5' except voids <1/16" increase to 40%, laminated bedding on last 4" of run	R21: 20 minutes
	146.0		NR	143.7, 144.0' - Mechanical break 144.4' - Fracture, 5 deg, rough, planar, tight 144.6, 144.7' - Fracture, horizontal, rough,		1	142.2-145.3' - pale yellowish brown transitions to yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained,	-
			2	undulating, open 144.9, 144.95, 145.0' - Bedding plane, horizontal, smooth, planar, tight to open up to 1/8"			moderate to mild HCl reaction, medium strong (R3), laminated bedding below 143.5' increasing crenulations with depth, bedding	-
	R22-NG - 4 ft 88%	56	5	146.3' - Fracture, 75 deg, rough, undulating, tight to open up to 3/16", gray staining on 20% at surface		1	angles up to 10 deg, voids <1/16" over 5% coverage except zone at 20% from 143.5-145.0' trace voids to	-
150	150.0		0 NR	146.5' - Fracture, 5 deg, rough, undulating, tight 147.1' - Fracture, 15 deg, rough, undulating, open		‡	3/16", color changes to moderate yellowish brown (10YR 5/4) at 144.8' No Recovery 145.3-146.0' Limestone	R22: 18 minutes
150 -107.€	150.0		INK .	open 147.2' - Fracture, 25 deg, rough, undulating, tight to open 1/8" 147.7' - Fracture, 10 deg, rough, undulating, tight 148.0' - Fracture, 10 deg, rough, undulating, open 148.2' - Bedding plane, 10 deg, smooth, undulating, tight 148.3' - Fracture, 10 deg, rough, undulating, open 148.9, 148.95' - Fractures, horizontal, smooth, planar, open up to 1/16"		-	Limestone 146.0-148.0' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, mild to moderate HCI reaction, medium strong to strong (R3 to R4), trace faint laminated bedding from 146.0-147.0', voids <1/16" over 1-10% increasing with depth 148.0-148.4' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCI reaction, very weak (R1), thin laminated bedding, voids <1/16" over 25% of surface 148.4-149.5' - yellowish gray, (5Y 7/2), fine grained, moderate HCI reaction, medium strong to strong (R3 to R4), thin laminated bedding, 5 deg angle bedding, trace voids <1/16", trace fossil casts, molds No Recovery 149.5-150.0' Bottom of Boring at 150.0 ft bgs on 2/10/2007	



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	B-28	SHEET	1	OF	q	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723060.1 N, 458242.6 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

WATER	LEVELS	: 2 ft bgs	on 4/25/0	)7 S	TART : 4/25/2007 END : 5/1/2007 LOGGE	R : D	Roraback
				STANDARD	SOIL DESCRIPTION	g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	EINTERVAL (ft) PENETRATION TEST RESULTS SOIL NAME, USCS GROUP SYMBOL, COLOR,					DEDTIL OF CACING POUL INC DATE
H BE ACE ATIO		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR	Ĭ	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EPT SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
41.5	0.0			(14)	Top Soil	7/1/	
-		1.5	SS-1	2-2-3	O-0.5' - roots Poorly Graded Sand (SP)		_
-	1.5			(5)	\ 0.5-0.9' - yellowish gray, (5Y 7/2), moist to wet, loose,		
-					fine grained, no HCl reaction, trace nonplastic fines, trace organics decreasing with depth	1	1
_					Poorly Graded Sand With Silt (SP-SM)	1	
					0.9-1.5' - moderate yellowish brown, (10YR 5/4), moist to wet, loose, fine grained, no HCl reaction,		
					10-15% nonplastic fines, trace roots		
_							
_						1	_
5 36.5	5.0				Cilly Cond (CM)	100	_
36.5				0-0-1	Silty Sand (SM) 5.0-6.2' - yellowish gray, (5Y 7/2), wet, very loose, fine	111	-
-		1.2	SS-2	(1)	grained, no HCl reaction, 25-30% nonplastic fines, trace roots	-	-
-	6.5				11001000	-	-
-						┨	-
-						1	-
-						1	-
-						1	-
-					•	1	-
10	10.0				•	1	
31.5					Silty Sand (SM)		Organic odor
		0.7	SS-3	1-2-3 (5)	10.0-10.7' - pale yellowish brown to dark yellowish brown, (10YR 6/2 to 10YR 4/2), wet, loose, fine		- Organio dadi
	11.5			(0)	grained, no HCl reaction, 15-20% nonplastic fines, 10% organics		
_					1070 Organics		_
_						1	_
_						1	-
_						-	-
-						-	-
						+	-
15 <u> </u>	15.0				Silty Sand (SM)		-
-		1.1	SS-4	2-4-10	$\sqrt{15.0-15.35}$ - light olive gray, (5Y 5/2), wet, very loose, $\sqrt{15.0-15.35}$		-
-	16 5	''	55-4	(14)	fine grained, mild HCl reaction, 25-30% low to   medium plasticity fines	111	1
-	16.5				Silt (ML)	1	1
-					15.35-15.55' - grayish orange, (10YR 7/4), wet, soft to medium stiff, fine grained, nonplastic, very rapid	1	-
-					dilatancy, mild HCl reaction, 5-10% very fine sand	1	1
-					Silty Sand (SM) 15.55-16.1' - yellowish gray, (5Y 8/1), moist, medium	1	
					dense, fine to medium grained, strong HCI reaction, 25% low to medium plasticity fines, two gravel-sized	1	_
					pieces up to 1"		
20							



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	B-28	SHEET	2 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723060.1 N, 458242.6 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

WATER	LEVELS	: 2 ft bgs	on 4/25/0	07	START : 4/25/2007 END : 5/1/2007	LOGGER	: D.	Roraback
				STANDARD	SOIL DESCRIPTION		g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			SYMBOLIC LOG	
H BE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COI MOISTURE CONTENT, RELATIVE DENSIT	_OR, Y OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
FYTH EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINER/		MB	INSTRUMENTATION
E S E				(N)			S	
21.5	20.0			7.0.0	<b>Silt (ML)</b> 20.0-21.0' - yellowish gray, (5Y 8/1), wet, very	/ stiff -		_
l _		1.0	SS-5	7-9-8 (17)	nonplastic, very rapid dilatancy, mild HCl read	ction		
	21.5			,				
						_		
	1					_		<u> </u>
-	1							<u> </u>
_	1					=		<u> </u>
-						_		<u> </u>
-	1					-		<u>-</u>
25	25.0					_		-
16.5	25.0				Silt With Sand (ML)		Ш	-
-		1.4	SS-6	10-15-15	25.0-26.4' - dark vellowish orange. (10YR 6/6	i), wet, -		-
-		1.4	33-0	(30)	very stiff, fine to medium grained, nonplastic, rapid dilatancy, mild to moderate HCI reaction	very n.		-
-	26.5				15-25% fine to medium sand-sized	"	ш	-
-						_		-
-						_		_
_						_		_
_						_		_
-						_		_
l _								_
30	30.0							_
11.5				17.00.17	Silt With Sand (ML) 30.0-31.0' - Same as 25.0-26.4' except moist	to wot -		_
		1.0	SS-7	17-20-17 (37)	hard, trace fine to coarse gravel-sized	io wei,		
	31.5			(51)				
					1	_		<u> </u>
-						_		
-	1							
-	1					_		<u> </u>
-	1					-		<u> </u>
1 -						-		·
35	25.0					-		
6.5	35.0				Sandy Silt (ML)		Ш	-
1 -		0.3	SS-8	4-0-0	35.0-35.25' - moderate yellowish brown, (10Y) wet, very loose, mild HCl reaction, 40% fine t	′R 5/4), /-		<u>-</u>
-		0.5	00-0	(0)	wet, very loose, mild HCI reaction, 40% fine t   medium sand-sized, trace organics	° /-		-
1 -	36.5				-			-
-						-		-
-						-		
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40						_		
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PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723060.1 N, 458242.6 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

WATER	LEVELS	: 2 ft bgs	on 4/25/0	)7 5	START : 4/25/2007 END : 5/1/2007 LOGG	BER:	: D.	Roraback
STANDARD				STANDARD	SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISOS CROLID SYMPOL COLOR			DEDTILOF CACING POULTS DATE
H BE ACE ATIO	RECOVERY (ft)				SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		30LI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
1.5	40.4	0.4	SS-9	50/5	Silty Sand With Limestone Fragments (SM)	コ	Ш	
1 [				(50/5")	40.0-40.4' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), wet, very			
_					dense, mild to moderate HCl reaction, 28% fines, 20% limestone fragments in lenticular shapes			_
-						] ]		_
-						4		-
-						4		-
-						$\exists$		-
-						1		-
45_	45.0					1		-
-3.5				00.00.47	Silt With Sand (ML) 45.0-46.0' - moderate yellowish brown, (10YR 5/4),	1	Ш	
-		1.0	SS-10	23-30-17 (47)	wet, hard, nonplastic, rapid dilatancy, mild to	1		
-	46.5			. ,	moderate HCl reaction, 10-15% fine sand-sized, 5-10% organics in <1/16" thick lenses	/4		-
-						´ -		-
-						-		-
-						┨		-
-						1		-
-						1		-
50	50.0					_]		
-8.5 -			00.44	13-24-50/5	Silt With Sand (ML) 50.0-51.3' - Same as 45.0-46.0' except 25% fine to	4		-
-	F4.4	1.3	SS-11	(74/11")	medium sand-sized, trace organics	4		-
-	51.4					寸		-
-						1		-
-						1		-
						1		
-						]		
_						4		-
55 <u> </u>	55.0			32-50/3	Silt (ML)	-	П	
-	55.8	0.8	SS-12	(82/9")	55.0-55.8' - Same as 50.0-51.3' except 10-15% fine sand-sized, trace organics in thin threads and chunks	4		-
-					Sand-sized, trace organics in thin threads and chunks	/ {		-
1 -						1		-
						]		
-						1		_
-						4		-
-						$\exists$		-
60						+		-
60						$\dagger$		
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PROJECT NUMBER:	BORING NUMBER:			
338884 FI	R-28	CHEET	4 OF 9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723060.1 N, 458242.6 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

WATER	LEVELS	: 2 ft bgs	on 4/25/0	)7 S	START : 4/25/2007	END : 5/1/2007	LOGGE	R : D	. Roraback
				STANDARD		SOIL DESCRIPTION		g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME LICOS OPOLID OVARDOLLOGICO		SYMBOLIC LOG	DEDTIL OF CACING PRILLING PATE	
H BE	RECOVERY (ft)				SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		30 Lic	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
EPT SURF SLEV			#TYPE	6"-6"-6" (N)	CONSISTEN	CY, SOIL STRUCTURE, MIN	ERALOGY	SYME	INSTRUMENTATION
-18.5	60.0	0.3	SS-13	50/4	_ Silt With Sand	And Limestone Fragment	ts (ML)		
_				(50/4")	60.0-60.3' - Sai	me as 55.0-56.0' except 20 sized, 20% coarse sand to	% fine to	1	1
-					gravel-sized lin	nestone fragments		1	1
								]	]
								]	
_								1	
_								4	-
_								4	-
	65.0							-	Complete soil sampling at 11:45 on 4/25/07
65 <u> </u>	65.1	0.0	SS-14	50/1	<b>☐ Limestone Fra</b>	gments		十	
-				(50/1")	\ 65.0-65.1' - ligh \reaction, fragm	nt gray, (N7), moderate to seents about 3/8"x3/4" in size	etrong HCI	1	1
-					Begin Rock Co	oring at 65.0 ft bgs		1	1
-					See the next sr	neet for the rock core log		1	1
								]	]
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								-	1
70 <u> </u>							-	4	1
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80							_	+	-



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-28

SHEET 5 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723060.1 N, 458242.6 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2 ff	bgs o	on 4/2	5/07 START : 4/25/2007 END : 5/	1/2007	LOGGER : D. Roraback	-																
\$ D ₽	(%	<u> </u>		DISCONTINUITIES	၂ ဗ္ဂ	LITHOLOGY	COMMENTS																
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,																
H BE ACE ATIC	TH.	(%) Q	F.0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	JOE I	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND																
무유의	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND	YMB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.																
		ď	F F	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS																	
-23.5	65.0		1	65.15' - Fracture, horizontal, rough,	$\vdash \vdash$	Limestone Fragments  - 65.0-66.2' - pale yellowish brown,	Start rock coring at 65.0'																
_				undulating, faces do not join together	Щ	(10YR 6/2), fine grained, moderate	Water level approximately 2.0' (very muddy, may not -																
			_2_	66.1' - Fracture, 10 deg, rough, undulating,		HCl reaction, medium strong (R3), large infilled cavities 1"-2", trace	be accurate, 4/25/07,																
	R1-HQ 5 ft 54%			open, weathered faces, shell like fossil imprint on both sides of fracture	Н	organic inclusions	15:00)																
-				66.15' - Fracture, horizontal, rough,	Ш	No Recovery 66.2-68.2'	Driller's Remark: Rods																
_		32		undulating			dropped at 66.0-68.0', - interpret lost recovery to be																
-	0170			68.15' - Fracture, horizontal, smooth,	Ш	- Limantona	from 66.2-68.2'																
-			3	rounded face	ш	_ <b>Limestone</b> 68.2-69.7' - Same as 65.0-66.2'	1																
-				68.35, 68.75' - Fractures (2), horizontal,	+	except small voids (<1/16") over 30%	R1: 5 minutes																
			3	smooth, undulating, tight 69.15, 69.3, 69.55' - Fractures (3), 0-20 deg,	П	of core, fossiliferous with few 1/4"-1/2" cavities (molds) with couple	-																
70 <u> </u>	70.0		NR	rough, undulating, slightly weathered, open —	世	of casts, increased large dissolution																	
20.0			8	70.0-70.4' - Fracture zone, five 1-2" angular fragments	₩	type cavities from 69.1-69.7'	-																
-				70.4' - Fracture, horizontal, rough, stepped,	Ш	No Recovery 69.7-70.0'  Limestone	-																
_			1	terminates fracture zone above 70.9' - Fracture, horizontal, rough, planar,	H	70.0-72.5' - moderate olive brown to																	
_				open - Fracture, nonzoniai, rough, pianai,	H	moderate yellowish brown, (5Y 4/4 to 10YR 5/4), moderate HCl reaction,	SC-1 collected at 71.5- 72.5' -																
_	R2-HQ 5 ft	65	2	71.5' - Fracture, 5 deg, rough, undulating	片目	medium strong (R3), highly	_																
	100%	00		72.8, 73.1' - Fractures (2), 10 deg, rough,	Н	fossiliferous with 30% fine (<1/16") voids and 5% 1/16"-1/8"																	
			2	stepped, some fragmentation		voids/casts/molds, several larger																	
			2	73.0' - Fracture, 70 deg, rough, planar, tight, some fragmentation	Ш	cavities up to 1", trace organic laminations/inclusions	1																
-				73.85, 74.2, 74.45' - Fractures (3), 10 deg,	$\mathbb{H}$	72.5-73.6' - Same as 70.0-72.5'	R2: 7 minutes																
75	75.0		3	rough, planar, open	Ħ	except 5-10% fine (1/16") voids, very	1																
-33.5	70.0			74.8' - Fracture, 60 deg, rough, undulating, — terminates with some rock fragments at end	Ш	few large voids or cavities, grayer 3/8" thick laminations throughout																	
-			>10	of core (75.0')	╂┼╂	core	-																
-				75.0-75.4' - Fracture zone, 1-2" fragments - 75.4' - Fracture, 10 deg, rough, planar, tight	ш	<ul> <li>73.6-78.1' - Same as 72.5-73.6'</li> <li>except very weak (R1)</li> </ul>	1																
-			>10	75.65, 75.7, 75.9, 76.1, 76.25, 76.27' -	$\Box$	- except very weak (IVI)	-																
-	R3-HQ			Fractures (6), horizontal, smooth to rough,	H	-	-																
-	5 ft	0	>10	planar, open 76.25-76.4' - Fracture zone, fragments up to	甘	_	-																
-	76%			3/4"	╀╫	-	-																
-														l					3	76.6' - Fracture, 45 deg, smooth, planar, slightly weathered, open	口	78.1-78.65' - Same as 72.5-73.6' except 0-10% fine voids	
-			7	76.8, 77.15' - Fractures (2), 10 deg, rough,	Ш	- 78.65-78.8' - Same as 73.6-78.1'	DO: 4 minutes																
_			NR	undulating, open, with rock fragments between	H	No Recovery 78.8-80.0'	R3: 4 minutes																
80	80.0			77.5-78.1' - Fracture zone	口	<del></del>	Drilling ended at 80.0' on 4/25/07 —																
-38.5			2	78.1' - Bedding plane, horizontal, rough,	Ш	Limestone - 80.0-83.8' - moderate yellowish	Drilling resumed on																
				stepped, open 78.3' - Fracture, 20 deg, rough, stepped,	$\square$	brown, (10YR 5/4), moderate to	4/26/07 Rock varies from																
			2 >10	open	Ш	strong HCl reaction, very weak to	competent to friable																
_				78.65' - Fracture, horizontal, rough, stepped, open	$\Box \Box$	<ul> <li>weak (R1 to R2), 25-40% fine (&lt;1/16") voids throughout core,</li> </ul>	intermittently with no clear																
-	R4-HQ			80.1' - Fracture, 20 deg, rough, undulating,	$\square$	fossiliferous with many 3/16" to 3/8"	contacts, but on the whole - described as friable																
I -	5 ft 76%	28		open 80.4' - Fracture, 10 deg, rough, undulating,	口	infilling	SC-2 collected at 80.5-																
-	. 5,3		>10	open	╁┼	9	81.6'																
-			>10	81.6' - Mechanical break		-																	
-				82.3' - Fracture, 60 deg, rough, undulating, open with lots of associated rock fragments	団	- No Recovery 83.8-85.0'	R4: 5 minutes																
-			NR	82.3-83.5' - Fracture zone, angular 3/4"-2"	H	-	-																
85	85.0			fragments	干																		
1					1																		

ORIENTATION: Vertical



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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SHEET 6 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723060.1 N, 458242.6 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS : 2 ff	bgs o	on 4/2	5/07 START : 4/25/2007 END : 5/	1/2007	7 LOGGER : D. Roraback										
×0.0	(9)			DISCONTINUITIES	၂၀	LITHOLOGY	COMMENTS									
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND HICKNESS, SURFACE STAINING, AND TIGHTNESS  DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS		SIZE AND DEPTH OF CASING,										
H BI	E RU STH, SVEF	(%) O	TO F	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD									
DEPT SURF	SOR! ENC	ROL	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3Y ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.									
-43.5	016	ш		83.5, 83.7' - Fractures (2), 20 deg, rough,	10)	Limestone										
-			2	undulating, slightly weathered	H	- 85.0-89.05' - Same as 68.2-69.7'	-									
-				85.45' - Fracture, 15 deg, rough, undulating, slightly weathered, open	H	except moderate yellowish brown, (10YR 5/4), very weak to medium	-									
-	R5-HQ 5 ft		1	85.6' - Fracture, 10 deg, rough, planar,	Ш	<ul> <li>strong (R1 to R3), 10-25% fine</li> </ul>	-									
-				weathered but tight 86.7' - Fracture, 40 deg, rough, undulating,	$\perp$	(<1/16") voids (fewer voids at 85.0-85.5', 88.1-88.2'), many 1/4"	-									
-		65	1	tight	Щ	<ul> <li>fossil molds/casts, some gray or</li> </ul>	-									
-	100%		$\vdash$	87.05' - Fracture, vertical, rough, undulating, tight	$\perp$	beige infill in cavities, trace organics	-									
-			2	87.25' - Fracture, 30 deg, rough, undulating,	+		- R5: 5 minutes									
-				tight, half of core is missing from 87.2-87.35' 88.1, 88.45' - Fractures (2), 10 deg, rough,	H											
-			2	undulating, tight		89.05-89.6' - Same as 85.0-89.05'  except interbedded zones of very	No. 3 minutes									
90 <u> </u>	90.0			89.25' - 10 deg, rough, undulating, tight to healed	Ш	weak (R1) rock with few voids and medium strong (R3) rock with 20%										
			1	89.8' - Fracture, horizontal, rough, undulating	$oldsymbol{arPsi}$	- voids	-									
-				to stepped, open 90.8, 91.3' - Fractures (2), 30 deg, rough,	П	89.6-93.4' - Same as 85.0-89.05'	-									
-			2	planar, opposing, tight	ш	-	-									
-	R6-HQ			91.9, 92.1' - Mechanical break (2), 60 deg,	Ш		-									
-	5 ft	72	2	rough, planar to undulating	+	<del>-</del>	-									
-	92%			92.9' - Fracture, 10 deg, rough, planar, fine	H	<del>-</del>	-									
-			6	organic lamination 93.25' - Fracture, 60 deg, rough, stepped,	H	93.4-94.6' - moderate olive brown to	-									
-				beginning of fracture zone	Ш	moderate yellowish brown, (5Y 4/4 to 10YR 5/4), very fine grained, mild to	R6: 15 minutes									
			1	93.3-93.5' - Fracture zone 93.5, 93.8, 94.2' - Fractures (3), horizontal,	Н	moderate HCl reaction, strong (R4),	-									
95 <u> </u>			NR	smooth, planar	H	no small (1/16") voids at top, increase with depth to 5% at bottom,	_									
-			5	95.5, 95.9' - Fractures (2), rough, stepped,	ш	a few 1/4" round cavities	-									
=				silty sand infilling, open	Ш	No Recovery 94.6-95.0' Limestone 95.0-98.3' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), 10-20% fine voids, small cavities up to 1/4" and larger and sometime elongated	-									
=		52	1		+		-									
-	R7-HQ 5 ft 90%			96.75' - Fracture, 40 deg, rough, stepped, tight	Н		-									
-			0	97.5' - Mechanical break	Ħ		-									
-					Ħ		-									
-				ı									3	98.2' - Fracture, 10 deg, smooth, planar, cavities contain light co	<ul> <li>cavities contain light colored infill, trace organics</li> </ul>	-
-			4	98.6, 99.5 - Fracture, vertical, rough,	oxplus	98.3-99.5' - Same as 95.0-98.3'	R7: 15 minutes									
100	100.0					l				NR	stepped, some fragmentation, some crystallization on surfaces	Ш	<ul> <li>except 3% fine voids, cavities up to 1" in size</li> </ul>	-		
-58.5	100.0		`	100.0-100.9' - Fracture zone, several No Recovery 99.5-100.0' horizontal and vertical fractures Limestone	No Recovery 99.5-100.0'	_										
-		>	>10		団	<ul> <li>Limestone 100.0-104.6' - Same as 95.0-98.3'</li> </ul>	-									
-				100.9, 101.15, 101.4, 101.9, 102.25' -	+	except sequence of rock with voids	-									
-			3	Fractures (5), 20-40 deg, rough, undulating,	Ħ	<ul> <li>and rocks without, with cavities present at at transitions, maximum of</li> </ul>	-									
-	R8-HQ			· ·	Ħ	35% fine voids	-									
-	5 ft 92%	43	43 3	102.25' - Fracture, vertical, rough, undulating, some fragmentation	Ш	-										
-				102.9' - Fractures (2), horizontal and 60 deg,	Ш	-										
-			1	rough, undulating, open 103.6' - Fracture, 20 deg, rough, undulating	H	-	1									
1 -			2	, -5, -15, /	囯	-	R8: 10 minutes									
105	105.0		NR		Ш	No Recovery 104.6-105.0'										
					$\Box$	-										



PROJECT NUMBER:

338884.FL

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723060.1 N, 458242.6 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER	LEVELS: 2 f	t bgs o	on 4/2	5/07 START : 4/25/2007 END : 5/	1/2007	7 LOGGER : D. Roraback	
				DISCONTINUITIES	SYMBOLIC LOG	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	3 Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-63.5 - - - - - - - 110	R9-HQ 5 ft 78% 110.0	37	6 1 >10 >10 NR	104.45' - Fracture, horizontal, rough, stepped, beige-colored infill 105.0-105.2' - Fracture zone, 1/2"-1" angular fragments 105.3' - Fracture, 50 deg, rough, stepped, open 105.9' - Fracture, 20 deg, rough, stepped, open 106.3' - Fracture, 45 deg, rough, planar, tight but weathered 107.1' - Fracture, 25 deg, rough, stepped, very open and weathered with dissolution and fragmentation 107.7-108.0' - Fracture zone, with angular rock fragments up to 2"		Limestone  105.0-108.4' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), small (1/4") fossil cavities often with cast, 10-25% fine (1/16") voids  108.4-108.9' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, 20% gravel, 30% sand, 50% silt-sized particles, very friable No Recovery 108.9-110.0'	
-68.5 - - - - - -	R10-HQ 5 ft 100%	93	0 0 1 0	108.15' - Fracture, 60 deg, rough, undulating, open 108.4' - Fracture, 10 deg, rough, stepped, open		Limestone - 110.0-114.4' - Same as 105.0-108.4'	Driller's Remark: Hit silt layer at 112.0' about 4" thick; not evident in core
115 -73.5	115.0		1	- 114.9' - Fracture, horizontal, rough,		114.4-115.0' - Same as 110.0-114.4' — except very weak (R1)	R10: 13 minutes -
- - - - - - - 120		47	1 2 1 2 NR	undulating 115.1' - Fracture, horizontal, rough, undulating  116.5' - Fracture, 40 deg, rough, undulating, open 116.6' - Fracture, 5 deg, rough, undulating, slightly weathered, open 117.1' - Fracture, horizontal, rough, undulating, open 118.05' - Fracture, 30 deg, rough, undulating, tight 118.3' - Fracture, rough, undulating, tight to open, 3" side fracture		115.0-117.5' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCI reaction, very weak (R1), 5-10% fine voids, few elongated 1/4"-1/2" fossil molds  117.5-117.95' - Same as 115.0-117.5' except medium strong to strong (R3 to R4), 0-10% fine voids, few elongated 1/4"-1/2" cavities/molds 117.95-118.2' - Same as 115.0-117.5' except very weak (R1), with increased voids to 15%	SC-3 collected at 115.1- 116.1'  R11: 6 minutes
-78.5 - - - - - - -		>10 120.0-120.2' - Fracture zone, subangular rock fragments 1/2"-1" in size 120.2' - Fracture, 5 deg, rough, undulating 120.4, 121.0' - Fractures (2), 25 deg, rough, stepped to undulating, open with subangular fragments			with increased voids to 15%  118.2-118.5' - Same as 115.0-117.5' except weak (R2), 10-15% fine voids  No Recovery 118.5-120.0' Limestone 120.0-121.2' - moderate yellowish brown to dusky yellow, (10YR 5/4 to 5Y 6/4), fine grained, moderate HCI reaction, medium strong (R3), fine voids (<1/16"), fossiliferous with voids and cavities primarily elongated up to 1/4"-1/2" No Recovery 121.2-125.0'	R12: Run time not	
125	125.0						recorded



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338884.FL

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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723060.1 N, 458242.6 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

				107 CTART : 4/05/0007 FAIR : 5/		Z LOCOED D Developin	ORIENTATION : Vertical
WATER	LEVELS : 2 f	t bgs (	on 4/2		1/200		COMMENTS
ŞQ⊋	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	ဗ္ဂ	LITHOLOGY	COMMENTS
NAN (	Ä ZAN S		SH	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
E SE	E FE	(%) Q	F.0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FR V	# <u>F</u>	OΩ	AC R F	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
DEPTH BELOW SURFACE AND ELEVATION (ft)	SEE	R	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	λS	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-83.5						Limestone	
-			3	125.35' - Fracture, 80 deg, smooth,	Н	<ul> <li>125.0-126.25' - moderate yellowish</li> </ul>	-
_				undulating, tight	H	brown to light olive brown, (10YR 5/4	-
			8	125.45' - Fracture, 20 deg, rough, planar, tight but weathered	Ш	to 5Y 5/6), fine grained, moderate  HCI reaction, medium strong (R3),	_
			٥	125.85' - Fracture, 0-70 deg, rough, stepped,	Н	10-20% small (1/16") voids, some	
_	R13-HQ			tight, some minor fragmentation		1/4" cavities	Driller's Remark: Rods
-	5 ft	22	NR	126.1' - Fracture, 10 deg, rough, undulating,	ш	- 126.25-127.0' - light olive gray, (5Y	dropped at 127.0-127.5', -
_	84%		1	minor fragmentation 126.35, 126.4, 126.45, 126.6, 126.75, 126.85'	Н	5/2), fine grained, moderate HCl reaction, strong (R4), 0-10% fine	interpret lost recovery to be _ from 127.0-127.8'
			1	- Bedding plane (6), horizontal, smooth,		- (1/16") voids, very fine horizontal	110111 127.0-127.8
			•	planar, tight to open	Н	laminations	
1 7				126.95' - Fracture, vertical, rough, planar	Ш	No Recovery 127.0-127.8'	R13: 9 minutes
100	400.0		>10	127.8' - Fracture, 10 deg, open, weathered 128.9' - Fracture, 10 deg, rough, undulating,	Н	<ul> <li>Limestone</li> <li>127.8-130.3' - Same as</li> </ul>	-
130 <u> </u>	130.0			tight, weathered	Ш	127.0-130.3 - Same as 125.0-126.25' except alternating very	
30.5			>10	129.4' - Fractures (2), 20 deg and 70 deg,	ш	<ul> <li>weak (R1) and medium strong (R3)</li> </ul>	] _
				rough, undulating to planar, tight, friable	Ы	zones below 128.8'	
			_1_	129.4-130.0' - Fracture zone, 1/2"-1" angular		130.3-131.3' - moderate yellowish brown to moderate olive brown,	
_				fragments 130.0-130.3' - Fracture zone, 1/2"-1"	Н	(10YR 5/4 to 5Y 4/4), fine grained,	1
-	R14-HQ			subangular rock fragments	ш	moderate HCl reaction, medium	-
_	5 ft	7		130.3' - Fracture, horizontal, rough, planar	Н	_ strong (R3), 20% voids <1/16",	-
	26%			130.6' - Fracture, 70 deg, rough, undulating,	H	several 1/4" cavities and few larger	_
			NR	trace iron oxide infill of 1/4" cavity on fracture face		elongated cavities No Recovery 131.3-135.0'	
_				131.0' - Fracture, horizontal, rough,	Н	_ 140 140000019 101.0-100.0	1
-				undulating, tight		-	R14: 6 minutes
-					Н	-	-
	135.0			4050405045			l —
-93.5			>10	135.0-135.3' - Fracture zone, 1/2"-1" subangular rock fragments	Ы	<b>Limestone</b> - 135.0-135.3' - Same as 130.3-131.3'	Driller's Remark: 134.0- 135.0' soft drilling -
			-10	135.3' - Fracture, 10 deg, rough, undulating,		except moderate olive brown to light	133.0 soit drilling
				open g, a day	ш	olive gray, (5Y 4/4 to 5Y 5/2)	Driller's Remark: Drilling
-			8	135.45' - Fracture, 5 deg, smooth, planar,	Н	- 135.3-136.45' - moderate olive	rod sank approximately 2" -
_	545.110			open 135.5, 135.65, 135.75, 135.77' - Fractures	$\Box$	brown, (5Y 4/4), moderate HCl reaction, strong (R4), 0-3% fine	during lunch break _
_	R15-HQ 5 ft	13	>10	(4), 10 deg, smooth, planar, tight but	Н	- (1/16") voids, horizontal bedding	_
	52%	.0		weathered	Ш	planes 1/8"-1/2" thick, trace organics	
1 7				136.45' - Fracture, 0-40 deg, rough, stepped,	Н	136.45-137.1' - alternating intervals	1
-			ND	open 136 5' Fracture herizontal rough planer	╁╫	<ul> <li>of material same as 135.0-135.3' and same as 135.3-136.45'</li> </ul>	-
-			NR	136.5' - Fracture, horizontal, rough, planar 136.6, 136.75, 136.85, 135.88, 136.95' -	Ш	137.1-137.6' - Same as 135.0-135.3'	R15: 7 minutes
-				Fractures (5), horizontal, rough, planar, tight	$\vdash$	No Recovery 137.6-140.0'	- 1170.7 111110100
	140.0			to open	口	<u></u>	
-98.5				136.7' - Fracture, horizontal, rough, planar, healed	$\vdash\vdash$	Limestone	
			4	137.1' - Fracture, 20 deg, rough, stepped,	ш	<ul> <li>140.0-140.15' - light olive brown, (5Y 5/6), fine grained, moderate HCl</li> </ul>	1
-				open, weathered	╂┼┤	reaction, medium strong (R3), 20%	-
-			2	137.1-137.6' - Fracture zone, rock fragments	Ш	- small (1/16") voids	-
				1/2"-2" 140.15' - Bedding plane, horizontal, rough,	Ш	140.15-143.2' - light olive gray to	-
	R16-HQ	22	>10	stepped, open	Н	yellowish gray, (5Y 5/2 to 5Y 7/2), very fine to fine grained, moderate	
1 7	5 ft 64%	22	/10	140.6, 140.8, 141.0, 141.25' - Fractures (4),	口	HCl reaction, strong (R4), 3-10%	]
1 -			0	0-20 deg, rough, stepped, 1/8" infilling, open,	H	small (<1/16") voids, several 1/4" to	1
-				breaks typically occur at large cavities 140.8-141.0' - Fracture, vertical, 1" fragments	ш	- 1/2" cavities, some molds/cast,	-
1 -			NR	141.95' - Fracture, 10 deg, rough, undulating,	$\vdash$	several up to 1" cavities, some with infill	D16: 12 minutes
1 _			141	highly weathered, tight, black organics on		No Recovery 143.2-145.0'	R16: 12 minutes
145	145.0			fracture face	Ш		



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723060.1 N, 458242.6 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

WATER	LEVELS : 2 f	t bas o	on 4/2	5/07 START : 4/25/2007 END : 5/	1/200	7 LOGGER : D. Roraback	
		.,,-		DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LO	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
(1) DEPTH BELOW  120	CORE RUN, 12.000 R 2.28 H RECOVERY (%) P. 12.00 RECOVERY (%) 12.00 R 1	RQ	S S S S PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS  142.3' - Fracture, 40 deg, rough, undulating		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
-				-		-	-
					1		



PROJECT NUMBER:	BORING NUMBER:

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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723157.5 N, 458338.8 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit

WATER	LEVELS	: 4.2 ft b	gs on 5/30	0/07 8	START : 5/23/2007 END : 5/31/2007 LOGG	ER :	: T. 3	Stewart, P. De Sa'rego
				STANDARD	SOIL DESCRIPTION	$oxed{oxed}$	Ō	COMMENTS
A P P P P P P P P P P P P P P P P P P P	SAMPLE	LE INTERVAL (ft)  PENETRATION TEST RESULTS  SQUI, NAME, LISCS CROUD SYMPOL COLOR					2 0	
ACE VIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SOLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
41.7	0.0			(14)	Poorly Graded Sand With Silt (SP-SM)		Ι¦Ι	Installed 6" SW casing to approximately 5'
-		1.5	SS-1	1-2-4	0.0-1.5' - very light gray to yellowish gray, (N8 to 5Y 8/1), moist, loose, fine grained, 5% nonplastic fines,	-13		below ground surface - Using 24" split spoon (SS)
-	1.5			(6)	10% organics, trace very fine sand-sized particles at	7	乩	
-	1.0				the bottom	1	.1.	-
_						1		_
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_						4		_
_						4		_
_						4		=
5 36.7	5.0				Clayey Sand (SC)	4	77	Water level assumed at 3.0' below ground
-		0.8	SS-2	0-1-2	√ 5.0-5.4' - pale green, (10G 6/2), wet, very loose, very			surface due to wet sample at 5.0' (SS-2) and -
-	0.5	0.6	33-2	(3)	\fine to fine grained, medium to high plasticity  Silt (ML)	H		increasing moisture content in SS-1 SS-2 taken at 14:36
-	6.5				\ 5.4-5.7' - grayish yellow, (5Y 8/4), wet, soft,	H		-
-					nonplastic, very rapid dilatancy, moderate HCl reaction, carbonate derived	1		-
-						1		-
_						1		_
						1		
l _								_
10	10.0				014 (841)	4		_
31.7		, ,		8-25-50/5	Silt (ML) 10.0-11.4' - grayish yellow mottled with moderate	4		-
-	11 1	1.4	SS-3	(75/11")	yellow, (5Y 8/4 with 5Y 7/6), moist, hard, nonplastic, very rapid dilatancy, moderate HCl reaction, trace	-		-
-	11.4				very fine sand, trace black fragments, carbonate	/#	щ	-
-					derived	1		-
-						1		-
-						1		-
-						1		-
-						1		
15	15.0					_]		_
26.7				04.44.47	Silt (ML) 15.0-16.0' - grayish yellow, (5Y 8/4), moist, very stiff,			SS-4 taken at 14:50
_		1.0	SS-4	21-11-17 (28)	nonplastic, rapid dilatancy, moderate HCl reaction,	$\perp$	Щ	
-	16.5				trace very fine to medium grained sand, carbonate derived	/ ]		_
-						4		-
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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723157.5 N, 458338.8 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit

ORIENTATION : Vertical

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						ry, auto nammer, AVVJ ro				ORIENTATION : VEItical
WATER	LEVELS	: 4.2 ft bo	as on 5/30		START : 5/23/2007	END : 5/31/2007 SOIL DESCRIPTION		EK:	. 1. }	Stewart, P. De Sa'rego  COMMENTS
≷Q₽	CANADI	INTERVA	I (f4)	STANDARD PENETRATION	<b>-</b>	JOIL DESCRIF HON		$\dashv$	98	COMMUNICATION
ELC ON (	SAMPLE		. ,	TEST RESULTS	SOIL NAM	IE, USCS GROUP SYME	BOL, COLOR,		길	DEPTH OF CASING, DRILLING RATE,
AAC		RECOVE			MOISTURE	E CONTENT, RELATIVE ICY, SOIL STRUCTURE,	DENSITY OR		BOI	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTEN	ICY, SOIL STRUCTURE,	MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
21.7	20.0			( )	Silty Sand (SN	Л)		+	П	SS-5 taken at 14:56
-		1.5	SS-5	16-12-14	20.0-21.5' - gra	ayish yellow, (5Y 8/4), v coarse grained, moder	wet, medium	1		-
-	21.5			(26)	trace fine grave	el-sized, 30-40% nonp	lastic fines,	+		-
-	21.5				carbonate deriv	ved		∕†′	Ш	-
-								1	- 1	-
-								┪	- 1	<del>-</del>
-								1	- 1	<del>-</del>
-								1		-
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25	25.0							1		-
16.7	25.5	0.5	SS-6	50/5.5	Silty Sand (SM	Л)		1	П	SS-6 taken at 15:02
-	20.0	0.0		(50/5.5")	25.0-25.5' - gra	ayish yellow, (5Y 8/4), v grained, moderate HCl	wet, very dense,	f'	ш	-
-					gravel-sized, 2	5-30% nonplastic fines	s, carbonate	/┨		-
-					\derived			′ ┨	- 1	-
-								┪		-
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-								1		-
30	30.0							1		-
11.7	30.0				Silt (ML)			$\dashv$	Ш	SS-7 taken at 15:10
-		1.2	SS-7	10-6-2	30.0-31.15' - lig	ght olive brown, (5Y 5/6) grained, mild to mode	6), wet, loose,	1		-
-	31.5			(8)	reaction, 62%	nonplastic fines, carbo	nate derived	/#	Ш	-
-	31.3							1		-
_								1		-
_								1		-
-								1		Driller's Remark: Hard at 32.8'
-								1		-
-								1		-
35	35.9							1		-
6.7	95:4	0.1	SS-8	50/1.5	\ \ \ Limestone Fra	agments And Silt		7	_	SS-8 taken at 15:22
_				(50/1.5")	∖35.0-35.1' - ligh HCl reaction	ht olive grey, (5Y 5/2),	mild to moderate	/ 🕇		-
_					(10110dotion			1	- 1	-
-								1		-
-								1		Driller's Remark: Drilled into softer zone after
-								1		37.0'
-								1		-
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40								1		-
								寸	╗	



PROJECT NUMBER:	BORING NUMBER:

338884.FL B-29 SHEET 3 OF 9

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723157.5 N, 458338.8 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 4.2 ft b	gs on 5/30	0/07 8	START : 5/23/2007 END : 5/31/2007 LOC	GGER	: T.	Stewart, P. De Sa'rego
>000				STANDARD	SOIL DESCRIPTION		ပ္	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE ATIC		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPT SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTATION
1.7	40.0	4.0	00.0	35-50/5.5	Silt With Sand (ML)		Ш	Drill time from 37.0-40.0' approximately 1-1/2
	41.0	1.0	SS-9	(85/11.5")	40.0-41.0' - moderate olive brown to light olive browr (5Y 4/4 to 5Y 5/6), moist to wet, hard, low plasticity,			minutes -
					rapid dilatancy, moderate to strong HCl reaction, 25% fine to medium sand-sized, carbonate derived, trace	% /]		
_					very fine sand-sized black particles	_/		_
-						4		_
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-								-
-						-		-
45	45.0					-		-
-3.3	70.0			25 40 50/4	Silt (ML)		Ш	SS-10 taken at 15:51
		1.3	SS-10	35-48-50/4 (98/10")	45.0-46.3' - Same as 40.0-41.0' except trace mediun sand-sized gray particles	n ]		
	46.3						Ш	
_						4		_
-						4		_
-								-
-						$\dashv$		-
-						- 1		-
50 50	50.0					- 1		-
-8.3	00.0				Silty Sand With Limestone Fragments (SM)		П	SS-11 taken at 16:00
		1.4	SS-11	34-27-30 (57)	50.0-51.4' - light olive gray, (5Y 5/2), wet, very dense fine to coarse grained, moderate HCl reaction, 40%			
	51.5			(4.7	sample is fine to coarse gravel-sized limestone, 30-35% low plastic fines, all carbonate derived	_	Ш	
_					Co 30 % for placific infect, all carbonate don'tou			_
-						4		-
-								-
-								-
-						-		-
55	55.0					+		-
-13.3	00.0	0.7	SS-12	39-50/3.5	Silty Sand (SM)	$\neg$	П	SS-12 taken at 16:10
	55.8	J,	50-12	(89/9.5")	55.0-55.7' - moderate olive brown, (5Y 4/4), wet,   √ dense, fine to coarse grained, moderate HCl reaction	n, /	Ш	_
					\\ 10% fine gravel-sized limestone, 40% low plastic \\ \fines, 5% organics, carbonate derived	/]		
_					imiss, one organiss, carbonate derived	]		
_						4		_
-						4		-
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-						$\dashv$		-
60						$\dashv$		-
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PROJECT NUMBER:	BORING NUMBER:		
338884 FI	B-29	CHEET	4 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723157.5 N, 458338.8 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 316625, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 4.2 ft b	gs on 5/30	0/07 5	START : 5/23/2007 END : 5/31/2007 LOGGER	R : T.	Stewart, P. De Sa'rego			
				STANDARD	SOIL DESCRIPTION	(J	COMMENTS			
AND (#)	SAMPLE	INTERVA	AL (ft)	PENETRATION TEST RESULTS		Ĭ				
DEPTH BELOW SURFACE AND ELEVATION (#)		RECOVI	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
HTH PAR EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	ΥMB	INSTRUMENTATION			
-18.3		0.0	SS-13	(N) 50/2	No Recovery 60.0-60.2'	Ś	Driller's Remark: Will add 60.0' of 4" HW			
-10.5	60.2	0.0	33-13	(50/2")	No Recovery 60.0-60.2	1	casing before continuing SPTs -			
-					Begin Rock Coring at 61.0 ft bgs	ł	Last ŠPT taken on 5/23/07 at 60.0' (SS-13) Deviated hole during 4" HW casing			
-					See the next sheet for the rock core log	ł	installation			
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723157.5 N, 458338.8 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.2	ft ba	s on 5	/30/07 START : 5/23/2007 END : 5/	31/20	D7 LOGGER : T. Stewart, P. De Sa'ı	rego
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 65 -23.3	61.0 R1-NQ 5 ft 52%	42	1 7 0 NR	61.5' - Fracture, horizontal, rough, undulating, possible contact between limestone and sand lens 62.0, 62.4' - Mechanical break (2) 62.6-63.0' - Fracture zone		Limestone 61.0-63.6' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, weak (R2), 30% surface coverage of voids up to 1/8" at 61.0-61.5', increasing to 40-50% coverage from 61.5-63.6', 10% dark (possibly organics) clasts up to 1/8" size, increasing to 3/8" size at 62.6-63.0' No Recovery 63.6-66.0'	Borehole construction is 5.0' of 6" SW casing installed to 5.0' below ground surface with 62.0' of 4" HW casing installed to approximately 60.0' P. De Sa'rego begins logging Water level: 4.2' below ground surface on 5/30/07 Driller's Remark: Possible sand lense at 61.5-63.0'; driller will advance casing R1: 5 minutes 11:55 Advancing HW casing to 65.0'
- - - - 70 -28.3	R2-NQ 5 ft 64% 71.0	42	1 3 >10 1 NR	66.6, 67.05, 67.25, 67.95' - Fractures (4), horizontal, smooth to rough, planar to undulating, 1/8" relief  68.65' - Fracture, horizontal, rough, undulating, 1/4" relief  69.05' - Fracture, <10 deg, rough, undulating		Limestone - 66.0-67.95' - Same as 61.0-63.6' - except trace cavities/fossil casts up to 1-9/16"x3/8" at 66.7-67.3' - 67.95-69.2' - Same as 61.0-63.6' - except very weak to weak (R1 to R2), 10-15 fossil casts/cavities up to 1-3/16"x3/8" - No Recovery 69.2-71.0'	R2: 6 minutes
	R3-NQ 5 ft 48%	28	0 >10 >10 NR	72.0-72.4' - Fracture zone 72.6' - Mechanical break 72.9-73.4' - Fracture zone		Limestone 71.0-71.95' - Same as 61.0-63.6' except 20-40% surface coverage of voids up to 3/16" (percentage increasing with depth),10-20%, cavities up to 1-3/16"x3/8", large (3-7/8"x3-1/8") cavity infilled with fine grained, weak (R2) carbonate material at 71.2-71.6', 20% of core contains black organic thread-like inclusions up to 1-9/16"x1/8" long 71.95-72.4' - Same as 61.0-63.6' except fine grained, very weak (R1), trace voids 72.4-73.4' - Same as 71.0-71.95'	SC-1 collected at 71.0-71.95' -
- - - - - 80 -38.3	R4-NQ 5 ft 40% 81.0	20	>10 2 NR	76.0-76.1' - Fracture zone 76.1-76.4' - Mechanical break 76.4-76.7' - Fracture zone 77.25, 77.7' - Fracture or mechanical break, rough, undulating, tight		except very weak (R1)  No Recovery 73.4-76.0' Limestone  76.0-76.7' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, very weak to weak (R1 to R2), 10-15% surface coverage of voids up to 1/8", trace infilled cavities up to 1-3/16"x3/8", infilled with fossiliferous limestone	R4: 9 minutes



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723157.5 N, 458338.8 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.2	tt ba	s on 5	/30/07 START : 5/23/2007 END : 5/	31/20	07 LOGGER : T. Stewart, P. De Sa'r	ego
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-43.3	R5-NQ 5 ft 88% 86.0	75	2 3 1 1 3 NR	81.7, 82.3, 82.5' - Mechanical break (3) 82.0' - Fracture, <5 deg, smooth, planar to undulating, tight  82.95, 83.4' - Fractures (2), <5 deg, smooth, planar to undulating 83.5' - Mechanical break  84.25' - Fracture, 10-15 deg, smooth, undulating  85.0, 85.2' - Fractures (2), 10-15 deg, rough, undulating		Limestone 76.7-78.0' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, very weak to weak (R1 to R2), 30-40% surface coverage of voids up to 1/8", 10-15% casts/cavities up to 1"x2" infilled with very soft black (possible organic) material No Recovery 78.0-81.0' Limestone 81.0-83.4' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl reaction, very weak (R1), 20-30% surface coverage of voids up to 1/16", 10% casts and	
	R6-NQ 5 ft 56% 91.0	22	1 >10 >10 NR	86.3' - Mechanical break 86.6' - Mechanical break 87.1- 88.1' - Fracture zone 88.3-88.6' - Fracture zone		cavities up to 1-9/16"x1-3/16", partially infilled with soft black (possible organic) material 83.4-85.1' - Same as 81.0-83.4' except weak to medium strong (R2 to R3) 85.1-85.4' - Same as 81.0-83.4' No Recovery 85.4-86.0' Limestone 86.0-87.6' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCI reaction, very weak to weak (R1 to R2), 10-15% voids up to 3/16", trace casts/cavities up to 3/8"x3/8"	
	R7-NQ 5 ft 70%	42	6 4 1 0 NR	91.0-91.4' - Fracture zone 91.7-91.75' - Fracture zone 92.0' - Fracture, <10 deg, rough, undulating, 1/16" relief 92.75' - Fracture or mechanical break, 35-40 deg, rough, undulating, 1/16" relief 93.9' - Fracture, horizontal, rough, undulating, 1/8-3/16" relief 94.2-94.5' - Mechanical break			R7: 6 minutes
	R8-NQ 5 ft 98% 101.0	38	2 >10 4 3 6	96.4' - sand/limestone contact, horizontal, rough, undulating 96.6' - Fracture, horizontal, rough, undulating 97.4' - Fracture, horizontal, rough, undulating 97.55-97.75' - Fracture zone 98.1, 98.5' - Fractures (2), horizontal, rough, undulating, 3/16" relief 98.6' - Fracture, 30 deg, rough, undulating 98.9-99.2' - Fracture zone (3 or more), 0-60 deg, rough, undulating 99.55, 99.85, 100.25' - Fractures (3), <30 deg, rough, undulating 100.55-100.9' - Fracture zone		9/16"x3/8", trace dark organic matter, large (2"x1") cavity at 93.8'   No Recovery 94.5-96.0'   Silty Sand (SM)   96.0-96.4' - carbonate derived, 30%   nonplastic fines	R8: 5 minutes



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723157.5 N, 458338.8 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.2	ft bg:	s on 5/	30/07 START : 5/23/2007 END : 5/	31/20	D7 LOGGER : T. Stewart, P. De Sa'	rego
<b>≥</b> ∩≎	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)			FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 105 -63.3	R9-NQ 5 ft 44% 106.0	31	NR) >10 4 >10 NR	101.5-102.1' - Fracture zone  102.5' - Fracture, 0-30 deg, rough, undulating, 1/8" relief 103.0-103.2' - Fracture zone, <3/16" relief		Limestone 96.4-100.9' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, very weak to weak (R1 to R2), extremely weak (R0) at 97.6', 15-20% surface coverage of voids up to 1/8", 10% casts/cavities up to 2"x3/8", partial recrystallization of carbonate material in voids No Recovery 100.9-101.0' Limestone 101.0-102.1' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, weak (R2), 5-10% surface coverage of voids up to 1/16", trace cavities up to 3/4"x3/8"	R9: 3 minutes Driller's Remark: Fluid loss at 105.0' below ground surface
	R10-NQ 5 ft 68%	46	>10 1 2 1 NR	106.5, 106.95' - Fractures (2), <10 deg, rough, undulating  107.7' - Fracture, <10 deg, rough, undulating 108.0' - Fracture, 30 deg, rough, undulating 108.5' - Fracture or mechanical break, <15 deg, rough, stepped, tight, <1/16" relief  109.3' - Fracture, horizontal, rough, undulating, 3/16" relief		- 102.1-103.2' - Same as 101.0-102.1' except very weak (R1) No Recovery 103.2-106.0' Limestone 106.0-109.4' - Same as 101.0-102.1' except very weak (R1) from 106.0-107.9' and 108.2-109.4'  No Recovery 109.4-111.0'	
-	111.0			-	H	_	_
- - - - - 115	R11-NQ 5 ft 14%	0	3 NR	111.0-111.3' - Fracture zone 111.4, 111.7' - Fractures (2), horizontal, rough, undulating		Limestone - 111.0-111.7' - Same as 101.0-102.1' - No Recovery 111.7-116.0'	Driller's Remark: No circulation -
-73.3				_	H		R11: 3 minutes
-	116.0		>10	116.0-116.2' - Fracture zone		Limestone - 116.0-116.5' - Same as 101.0-102.1'	
-			2	116.5-116.85' - Fracture zone  117.5' - Fracture, horizontal, rough, planar to		116.5-118.8' - pale yellowish orange to light gray, (10YR 8/6 to N7), coarse grained, strong HCl reaction,	Water level: 4.4' below ground surface on 5/31/07
-	R12-NQ			stepped, 1/8" relief	H	extremely weak to very weak (R0 to R1), trace voids (<3/16"), trace	Driller's Remark: Still no
- 120 -78.3	5 ft 56%		4 NR	117.6-117.85' - Fracture, 50 deg, rough, undulating, 1/8" relief 118.05' - Fracture, horizontal, rough, undulating, tight, 1/16" relief 118.4-118.8' - Fracture zone		cavities to 1"x1/8", highly friable, fossiliferous, "coquina" appearance, increase in gray color (fossils)     corresponds to increase in HCl reaction and decrease in hardness     No Recovery 118.8-121.0'	circulation -
	121.0						



PROJECT NUMBER:

338884.FL

BORING NUMBER:

B-29

SHEET 8 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723157.5 N, 458338.8 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

				IENT : CIVIE 55 5/N 5 10025, HILL TOTALLY, NQ 1001S, HW C			ORIENTATION : Vertical
WATER	LEVELS : 4.2	ft bg	s on 5/		31/20		
≥∩≎	, (6)			DISCONTINUITIES	ဖွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	0.77	œ	# 5	THICKNESS, SURFACE STAINING, AND HIGHTINESS	Ś	CHARACTERISTICS	· ·
_			2 >10	- 121.85, 121.9' - Mechanical break (2) 121.5-123.0' - Fracture zone		Limestone 121.0-121.55' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, weak (R2), 10-15% surface coverage of voids up	SC-2 collected at 121.0- 121.9' - Driller's Remark: No fluid
-	R13-NQ 5 ft 92%	36	3	- 123.3' - Fracture, horizontal, rough, - undulating, 3/16" relief		to 1/8", trace casts/cavities up to 1-3/16"x3/8" - 121.55-124.7' - Same as 121.0-121.55' except 10-20% surface	circulation -
125_ -83.3			3	123.95' - Fracture, 20 deg, rough, undulating, 1/8" relief - 124.35' - Fracture, <10 deg, rough, undulating 124.45-124.7' - Fracture, 60 deg, rough,		coverage of casts/cavities up to  1-3/16"x3/8", with trace carbonate infill/recrystallization  124.7-125.6' - Same as  121.0-121.55'	R13: 5 minutes
	126.0		NR	undulating	Ш	No Recovery 125.6-126.0'	
	120.0		0 /	124.85' - Fracture, 60 deg, rough, undulating, 3/16" relief - 124.85-125.2' - Mechanical break, 60 deg 125.25' - Mechanical break		Limestone 126.0-126.1' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, medium strong (R3), no visible voids, 10% fossil casts up	Driller's Remark: No fluid circulation
- -	R14-NQ 5 ft 2%	0	NR	- - -		to 9/16"x9/16"  No Recovery 126.1-131.0'  -	- - - -
130 -88.3 -	131.0			_		-	R14: 3 minutes
-	131.0		8	131.1, 131.2, 131.25, 131.45, 131.6' - Fractures (5), horizontal, smooth to rough, planar		Limestone 131.0-133.9' - Same as 121.0-121.55' except coarse grained, 50-60% surface coverage of voids up	- Driller's Remark: No fluid
- -	R15-NQ 5 ft	7	5	131.7, 131.75, 131.95' - Fractures (3), <5 deg, rough, undulating 132.1, 132.2, 132.25, 132.55, 132.95' - Fractures (5), <10 deg, rough, undulating		to 3/16" at 132.1-132.3", and medium gray (N5) mottling at 133.2-133.9'	circulation -
- 135	58%	•	ND	133.2, 133.4, 133.6, 133.65' - Fractures (4), <10 deg, rough, undulating -		No Recovery 133.9-136.0'	-
-93. <del>3</del> -	136.0		NR			Limestone	R15: 4 minutes
-			4	136.1, 136.9' - Fractures (2), <5 deg, rough, undulating, 1/8" relief 136.75, 137.5' - Fractures (2), 15-20 deg, rough, undulating, 3/8" relief		- 136.0-136.9' - Same as 121.0-121.55' 136.9-140.1' - medium light gray and	- Driller's Remark: No fluid
-	R16-NQ 5 ft	28	>10	137.25- 137.5' - Fracture zone, <10 deg, rough, undulating, 4 fractures 137.6-138.15' - Fracture zone		<ul> <li>very pale orange, (N6 and 10YR 8/2), fine grained, mild to moderate HCI reaction, medium strong to strong</li> <li>(R3 to R4), trace voids up to 3/16",</li> </ul>	circulation - SC-3 collected at 138.15- 139.05'
140	82%		5	139.05, 139.1, 139.4, 139.7, 139.9' - Fractures (5), <10 deg, rough, undulating, <1/1/16" relief, black stains on 80% of surface		20-30% casts/cavities up to 2-3/8"x1-3/16" at 138.3-140.1', black organic infill at 139.4-140.1'	-
-98.3 -	141.0		NR	-17 TO TORIOI, DIAGN STAIRIS OF OU 70 OF SURFACE		No Recovery 140.1-141.0'	R16: 14 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-29	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723157.5 N, 458338.8 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.2	2 ft bg	s on 5	/30/07 START : 5/23/2007 END : 5/	31/20	D7 LOGGER : T. Stewart, P. De Sa'ı	rego
≳D≎	(%)			DISCONTINUITIES	)G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
145 -103.3	-	33	2 1 NR	141.1' - Fracture, horizontal, rough, undulating, 3/8" relief 141.85' - Fracture, 15 deg, rough, undulating, 1/8" relief 142.05' - Fracture, horizontal, rough, undulating		Limestone  141.0-141.9' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine grained, mild HCI reaction, medium strong (R3), trace (<5%) surface coverage of voids up to 1/16", trace cavities up to 9/16"x3/8" 141.9-142.05' - Same as 121.0-121.55'  142.05-142.8' - Same as 141.0-141.9' 142.8-143.0' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCI reaction, weak (R2), 60-70% surface coverage of voids up	Driller's Remark: Very soft at 143.3-145.0'
- - - - - - 150	R18-NQ 5 ft 64%	42	3 3	146.35, 146.55' - Fractures (2), horizontal, rough, planar 147.05, 147.25' - Fractures (2), <15 deg, rough, undulating, tight 147.75' - Fracture, <15 deg, rough, undulating, tight 148.65-149.05' - Fracture zone 148.65' - Fracture, <15 deg, rough, undulating, tight		to 3/16", 10-15% casts/cavities up to 3/4"x3/8"  No Recovery 143.0-146.0'  Limestone  146.0-146.55' - Same as 142.8-143.0'  146.55-148.5' - Same as 141.0-141.9' 148.5-149.2' - Same as 142.8-143.0'  No Recovery 149.2-151.0'	SC-4 collected at 147.75- 148.60'
-108.3 -	151.0		NR	-		Bottom of Boring at 151.0 ft bgs on 5/31/2007	R18: 7 minutes  Total depth of boring at 151.0' below ground - surface 10:19, 5/31/07
							- - - - - - - - - - - - - - - - - - -



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-30	SHEET	1	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.1 N, 458444.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 2.4 ft bo	gs on 5/03	3/07	START : 5/2/2007 END : 5/6/2007 LOGGER : D. Roraback
				STANDARD	SOIL DESCRIPTION O COMMENTS
AND AND	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISSS CROUP SYMPOL COLOR
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
42.2	0.0			(. 1)	Poorly Graded Sand With Silt (SP-SM)
-		1.4	SS-1	2-4-4	\[ \bigcup 0.0-0.45" - dark gray, (N3), moist, loose, fine grained, \[ \square \] \[ \text{no HCI reaction, silica sand to 1/32", 15% fines, } \]
_	1.5			(8)	\predominately organics, roots / \bar\cap\cap\cap\cap\cap\cap\cap\cap\cap\cap
-					Poorly Graded Sand (SP) 0.45 -1.4' - very light gray to light gray, (N8 to N7),
					moist, loose, very fine grained, no HCl reaction, silica sand to <1/32", trace nonplastic fines
					Sand to <1/32 , trace nonplastic lines
_					<u> </u>
_					_
_					<b>-</b>
5 37.2	5.0				Silty Sand (SM) Water level 2.4' below ground surface on
		0.4	SS-2	2-5-3	5.0-5.9' - light brownish gray with medium gray
-		0.4	55-2	(8)	mottling, (5YR 6/1 with N4), wet, loose, very fine grained, medium to high plasticity, no HCI reaction,
_	6.5				silica sand to <1/32", 30-40% fines, trace roots
-					<b>-                                    </b>
_					<b>-                                    </b>
-					† <b> </b>
_					<b>-</b>
_					<b>1</b>
10	10.0				<b>1</b>
32.2				4.0.0	Silt (ML) 10.0-11.2' - yellowish gray, (5Y 7/2), wet, medium stiff,
_		1.2	SS-3	1-6-6 (12)	nonplastic, very rapid dilatancy, moderate to strong
_	11.5			, ,	HCl reaction, trace very fine sand-sized, carbonate
-					<b>-</b>
_					-
-					-
-					
-					
15	15.0				
27.2	15.0				Sandy Silt (ML)
_		1.5	SS-4	0-21-35 (56)	15.0-16.5' - yellowish gray, (5Y 5/2), wet, hard, medium dense, nonplastic, very rapid dilatancy,
-	16.5			(36)	moderate HCl reaction, 25-30% fine to coarse
					sand-sized, 2-3 limestone lenses to 1" thick, carbonate derived
					] [
					] ]
_					] ]
-					
-					
20					<del>                                     </del>



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-30	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.1 N, 458444.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 2.4 ft bo	gs on 5/03	3/07	START : 5/2/2007 END : 5/6/2007	LOGGEF	: D.	Roraback
>				STANDARD	SOIL DESCRIPTION		ŋ	COMMENTS
AND (#)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	COLL NAME TICOS OBOTIL CAMBOL COL	OD	970	DEDTIL OF CACING DRILLING DATE
ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COI MOISTURE CONTENT, RELATIVE DENSIT	Y OR	30 Li	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERA	ALOGY	SYMBOLIC LOG	INSTRUMENTATION
22.2	20.0			(14)	Silty Sand With Limestone Fragments (SM)		Ï	
-		0.4	SS-5	6-6-6	20.0-20.9' - light olive gray, (5Y 5/2), wet, medense, fine to coarse grained, moderate HCl	dium - reaction		·
-	21.5			(12)	\ 35% fine to coarse gravel-sized limestone fra	gments,		-
-					∖30% plastic fines, all carbonate		l	-
-						_	1	<u> </u>
						_	1	
_						_	l	_
-						_		_
25	25.0							
17.2				4-2-8	Sandy Silt (ML) 25.0-25.6' - dusky yellow, (5Y 6/4), wet, stiff,	medium _	Ш	_
-		0.6	SS-6	(10)	dense, fine to medium grained, low plasticity, dilatancy, moderate to strong HCl reaction, 3	rapid		-
-	26.5				fine to medium sand, 10-15% fine gravel-size	ed -	l	-
-	-				limestone fragments, all carbonate		1	-
-	-					-	l	-
-	-					-	l	-
-						-	l	-
-						-	l	-
30	30.0					-	l	-
12.2	30.0				Sandy Silt With Limestone Fragments (SM)			
-	1	0.9	SS-7	12-8-15 (23)	30.0-30.85' - Same as 25.0-25.6' except very 15% fine to coarse gravel-sized limestone fra	stiff, -		-
-	31.5			(23)		<u> </u>	l	<u> </u>
_						-	1	<u> </u>
						_	1	
_						_	l	_
-						_	l	_
-						_		-
-						_		-
35	35.0 35.2	0.2	SS-8	50/2	─ Limestone Fragments		H	
		0.2	00-0	(50/2")	\ 35.0-35.2' - light olive gray, (5Y 5/2), mild to r	noderate /-		-
-					HCI reaction, very poor recovery, two limesto fragments, to 1/2"	ne / _	l	-
-	-				inaginonia, to 1/2		l	-
-						-	l	-
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PROJECT NUMBER:	BORING NUMBER:	
338884.FI	B-30	SHEET 3 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.1 N, 458444.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 2.4 ft bo	gs on 5/03	3/07 5	START : 5/2/2007
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	RECOVE		PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
2.2 - - - - - -	40.0	0.2	SS-9	50/2 (50/2")	Limestone Fragments 40.0-40.2' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, wafer-shaped limestone fragments to 1/4" thick, fine to coarse sand-sized fragments
45	45.0 45.2	0.2	<u>SS-10</u>	50/2.5 (50/2.5")	Limestone Fragments And Silty Sand (SM)  45.0-45.2' - light olive gray, (5Y 5/2), wet, very dense, low plasticity, moderate HCl reaction, fine to medium sand-sized with 15-25% fines, 70% limestone fragments, 30% sand, all carbonate  Begin Rock Coring at 45.0 ft bgs See the next sheet for the rock core log
50_ -7.8 -    					
55_ -12.8 - -12.8 - - - - - - - - - - - -					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-30	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.1 N, 458444.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

				TENT . CIVIE 33 3/N 299203, HILL TOTALLY, INC. LOUIS, HWY C			ORIENTATION : Vertical
WATER	LEVELS : 2.4	ft bg	s on 5/		6/2007		Ţ
>^^				DISCONTINUITIES	ڻ ا	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
BH	P. Y. Y.	(%	FRACTURES PER FOOT		임	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
ΞĂΞ	9.00 1.00	(%) O	FE	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BO	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
989		Ø	RA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	≥	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
		ட	шш	, , , , , , , , , , , , , , , , , , ,	0)		Danis saak aasi 1451
-2.8	45.0		1	45.0-45.5' - Fracture, 85 deg, rough, undulating	Ш	Limestone - 45.0-48.5' - moderate olive brown,	Begin rock coring at 45'
			'	dilddiating		(5Y 4/4), mild to moderate HCl	
_				•	Н	reaction, extremely weak to very	-
-			>10		+	<ul> <li>weak (R0 to R1), very fine to medium</li> </ul>	-
_				46.6' - Fracture, horizontal, rough, undulating,	Ш	grained voids to 1/16", 25-30%	_
	R1-NQ	22	3	open 46.7-46.9' - Fracture zone, <5-90 deg, rough,	$\vdash$	casts/molds up to 3/8" over 5-10% of surface, trace black (N1)	
	5 ft 70%	33	3	undulating, open	H	carbonaceous inclusions	_
-	1070		2	47.1' - Fracture, horizontal, rough, undulating,	ш	_	-
-				open	+	No Docovery 49 E E0 0'	_
_				47.5' - Fracture, 15-25 deg, rough,		No Recovery 48.5-50.0'	_
			NR	undulating, tight 47.8-48.4' - Fracture, 85-90 deg, rough,	Ш		R1: 4 minutes
50	50.0			undulating, tight	Ш	_	1
-7.8	50.0			48.1' - Fracture, horizontal, rough, stepped,		 Limestone	
-			>10	tight .	╀┼┤	50.0-51.4' - moderate olive brown,	-
l _				48.4' - Fracture, 10 deg, rough, undulating, tight	Ш	_ (5Y 4/4), moderate HCl reaction,	_
			ا م	50.0-50.2' - Fracture zone, angular	Н	weak to medium strong (R2 to R3),	
			3	gravel-sized limestone fragments	$\Box$	<ul> <li>very fine to fine grained, carbonate, voids to 1/16" over 20-25%, cavities</li> </ul>	1
-	R2-NQ			50.55-50.8' - Fracture, 45 deg, rough,	ш	to 3/8" over <5%, sparsely	-
-	5 ft	23	3	undulating, tight	+	- fossiliferous	-
_	90%			51.0-51.35' - Fracture, 80-85 deg, rough, undulating, open		51.4-54.5' - moderate olive brown,	_
			>10	51.7' - Fracture, horizontal, rough, undulating,	Ш	(5Y 4/4), fine to medium grained, moderate HCl reaction, extremely	
			>10	open	Н	weak to very weak (R0 to R1),	_
-			1	51.9-52.1' - Fracture, 70-75 deg, rough,	П	friable, becoming very weak (R1) at	R2: 6 minutes
-				undulating, open 52.3' - Fracture, 20 deg, rough, undulating,	+	54.0' and below, black	-
55 <u> </u>	55.0		NR	semi-tight —	ш	carbonaceous/organic lenses/laminae (1/16") very abundant	_
-12.0			4	52.6, 52.8, 53.1, 53.3,' - Fractures (4),	Н	at 53.5', voids (<1/16") over 20-25%,	_
			_	horizontal, rough, undulating, semi-tight		cavities (<3/8") over 5% of surface,	
				53.4-53.8' - Fracture zone, horizontal 54.0' - Fracture, 50 deg, rough, undulating,	Ш	poorly fossiliferous	_
-			3	open	$\Box$	No Recovery 54.5-55.0'	-
-	D0 N0			55.25' - Fracture, <5-70 deg, rough, stepped,	口	Limestone 55.0-56.8' - moderate yellowish	-
1 -	R3-NQ 5 ft	17	4	open	Н	brown, (10YR 5/4), mild HCl reaction,	_
	54%	.,		55.42' - Fracture, <5 deg, rough, stepped, open, black carbonaceous stain over 30% of		weak (R2), low density, thin black	
_				surface		carbonaceous laminae at 55.0-55.2'	1
-			, ,_	55.54' - Fracture, 10 deg, smooth, planar to	╂┼╂	with discontinuous carbonaceous laminae below, voids (generally	
-			NR	stepped, open, black carbonaceous film over	口	- <1/16") over 15-20% of surface,	R3: 9 minutes
-				20%	╁┼┤	some cavities (<1/16"), fossil	_
60	60.0			55.68' - Fracture, <5 deg, rough, stepped, open, black carbonaceous film over 5%		mold/casts sparse	Hit pocket at 60'
-17.8			1	56.0' - Fracture, <5 deg, rough, undulating,	Ш	56.8-57.7' - yellowish gray, (5Y 7/2), dense, mild HCl reaction, medium	Losing sample core kicked — over sideways, no way of
-				tight	╁┼┼	strong (R3), voids (1/16" or less)	knowing orientation of core
-				56.52' - Fracture, horizontal, rough, planar,	口	unevenly distributed across 10-15%	Rock re-ordered rock into -
_				tight 56.82' - Fracture, 0-60 deg, rough, stepped,	╁┴┨	of rock surface, cavities rare, fossil	more logical sequence
				open	Ш	molds/casts sparse	during field review
1 -	R4-NQ			57.25' - Fracture, <5 deg, smooth,	H	<ul> <li>No Recovery 57.7-60.0'</li> <li>Limestone</li> </ul>	1
-	5 ft 9%	0	NR	undulating, open	ᡛᡃᡰ	60.0-60.45' - yellowish gray, (5Y 7/2),	1
-	9%		' ' '	57.35' - Fracture, <5 deg, smooth, planar, open, carbonaceous staining/film over 10%	口	<ul> <li>dense, mild to moderate HCl</li> </ul>	No recovery due to blocked
-				57.5-57.6' - Fracture zone, gravel-sized rock	$\vdash\vdash$	reaction, medium strong to strong	core barrel
				fragments, rounded to angular		(R3 to R4), black, thin, carbonaceous laminae common, voids/cavities <1%	
1 -				60.25' - Fracture, horizontal, smooth,	Ш	surface, fossil molds/casts sparse to	R4: 16 minutes
	05.0			undulating, tight, black carbonaceous film	╂┼┼	absent	1
65	65.0			covering 20% of rock surface	仠		-



PROJECT NUMBER:	BORING NUMBER:						
338884.FL	B-30	SHEET	5	OF	9		

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.1 N, 458444.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

				TENT . CIVIE 33 3/N 299203, ITIUU TOLATY, INQ LOUIS, HWY C			ORIENTATION : Vertical
WATER	LEVELS : 2.4	ft bg	s on 5		6/2007	LOGGER : D. Roraback	•
>				DISCONTINUITIES	ტ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		Ś	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표원한	ER, A	(%	FRACTURES PER FOOT		임	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
₽₹₹	A TO	(%) □	FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BO	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
989	E E S	Ø	RA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	≥	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	Olk	Œ	шп		S		
-22.8			2	65.1' - Fracture, horizontal, rough, undulating,	Н	No Recovery 60.45-65.0'	
			-	open	Ш	<ul> <li>Limestone 65.0-68.8' - light olive gray, (5Y 5/2),</li> </ul>	
-				65.9, 66.1, 66.2' - Mechanical break (3)	$\Box$	very fine to fine grained, mild HCl	-
-			4	CC EL Fractura E 10 des amanth	₽	- reaction, extremely weak (R0),	_
I _				66.5' - Fracture, 5-10 deg, smooth, undulating, tight	Ш	friable, nonplastic silt along fractures,	_
	R5-NQ			66.7' - Fracture, 10 deg, rough, undulating,	Н	voids to 1/16" over 10%, casts/molds	
_	5 ft	13	3	tight	H	up to 3/8" over <5% of surface	_
_	96%			67.1' - Fracture, horizontal, rough, undulating,	ш	-	-
_			3	open	$\vdash$	_	_
				67.3' - Fracture, 45-50 deg, smooth, stepped,	Н	- 68.8-69.8' - light olive gray, (5Y 5/2),	
				open 67.6' - Fracture, 45 deg, rough, undulating to	Ш	fine grained, moderate HCl reaction,	R5: 10 minutes
			1	stepped, open	╁┼	very weak to weak (R1 to R2), voids	-
70 <u> </u>	70.0		NR	68.3' - Fracture, 0-5 deg, rough, undulating, —	╀┼┼	— to 1/16", molds/casts to 3/8", on	
-27.0			2	open	Ш	5-10% of surface, occasional	_
			-	68.4' - Fracture, 0-5 deg, rough, undulating,	$\vdash$	carbonaceous laminae on 1-3% of surface	
_				open 68.8' - Fracture, 0-5 deg, rough, undulating,		No Recovery 69.8-70.0'	1
-			0	tight	ш	Limestone	-
_				69.5' - Fracture, horizontal, rough, undulating,	$\vdash$	70.0-70.7' - moderate olive brown,	_
	R6-NQ	53	3	open		(5Y 4/4), fine to medium grained,	
	5 ft 94%	55	ا	70.7' - Fracture, 0-5 deg, rough, undulating,	Ш	moderate to strong HCl reaction,	
-				open 70.75' - Fracture, horizontal, rough,	$\Box$	medium strong (R3), voids to 1/16"on 35-40% of surface, casts/molds to	-
_			>10	undulating, open	ш	3/8" over 5%, fossiliferous	-
I -				72.2' - Fracture, 10 deg, rough, stepped,	₽₽	_ (molds/casts)	
			2	open	Ш	70.7-73.6' - light olive gray, (5Y 5/2),	R6: 10 minutes
75	75.0		NR	72.6-72.8' - Fracture, 60-65 deg, rough,	Ш	moderate to strong HCl reaction,	_
-32.8	75.0		INIX	undulating, open 72.8-73.6' - Fracture, 85-90 deg, rough,	╁┼	medium strong (R3), voids to 1/16" over 3-5% of surface, sparsely	
-			3	undulating, tight	ш	distributed throughout interval and	_
_				73.6-73.9 - Fracture zone, 0-90 deg, rough,	$\vdash$	concentrated in possible cavity	SC-1 collected at 75.8-
			_	stepped to undulating, open	Н	infillings, fossils rare to absent,	76.7'
_			0	74.2, 74.3' - Fractures (2), horizontal,		- casts/molds to 3" on 10% of surface,	_
-	R7-NQ			smooth, planar, open 75.1' - Fracture, 0-10 deg, rough, stepped,	++	silty sand along fractures 73.6-74.3' - Same as 70.7-73.6'	_
_	5 ft	48	>10	open	$\vdash \vdash$	except yellowish gray, (5Y 7/2),	_
I -	94%			75.2-75.3, 75.4-75.5' - Fractures (4), 30 deg,	Щ	extremely weak (R0), becoming	
				rough, undulating, tight	H	coarser grained, with very soft clay	
-			0	77.2' - Fracture, 0-5 deg, smooth, stepped, open	口	<ul> <li>along fractures, friable, sandy texture</li> <li>74.3-74.7' - Same as 70.7-73.6</li> </ul>	1
-			H.,	77.4' - Fracture, 0-15 deg, smooth, stepped,	╁┼┼	except yellowish gray, (5Y 7/2)	R7: 9 minutes
-			3	open -	╆╫	- No Recovery 74.7-75.0'	-
80	80.0		NR	77.5-78.0' - Fracture zone, 0-70 deg, rough,	口	Limestone	
-37.8				stepped to undulating, open, gravel sized	Н	75.0-77.2' - yellowish gray, (5Y 7/2),	
-			>10	limestone rock fragments 78.6-78.7' - Mechanical break	ш	<ul> <li>very fine to fine grained, strong HCl reaction, very weak to weak (R1 to</li> </ul>	1
-				79.0-79.3' - Fracture, 50-60 deg, rough,	╁┼	R2), voids to 1/4" over 3-5%, cavities	-
_			1	undulating, tight	₽₩	to 3/8" over <1% of surface, poorly	-
I -				79.45' - Fracture, horizontal, rough,	Ш	fossiliferous	
	R8-NQ		ا م	undulating, tight	Н	77.2-77.7' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction,	1
-	5 ft 58%	30	3	79.6' - Fracture, 50 deg, rough, stepped, open	世	extremely weak (R0),	1
-	3070			80.0-80.2' - Fracture zone, gravel-sized	Ш	nonfossiliferous, very thin	-
-				limestone rock fragments	$\vdash\vdash$	discontinuous black carbonaceous	-
			NR	80.35-80.5' - Fracture, 70-80 deg, rough,	口	laminae, rounded to subrounded	
1			' '' \	undulating, open 80.5-80.7' - Fracture zone, rough, planar to	Ш	clast-like inclusions (3/8"-3/4") of moderate olive brown (5Y 4/4),	R8: 7 minutes
	05.0			stepped, horizontal to high angle, open	†⊣†	extremely weak (R0) limestone	-
85	85.0		$\vdash$		ဓ		<del>-</del>



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-30	SHEET	6	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.1 N, 458444.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

-				HENT . CIVIE 33 3/N 299203, HIND TOTALLY, INQ TOOLS, HWY C			ORIENTATION : Vertical
WATER	LEVELS : 2.4	ft bgs	s on 5		6/2007		I
<b>₹</b> □₽	(%)			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OUTE AND DEDTIL OF GARNING
뿝병은	Z,H ÆR.A	(%) Q	NE	DEDTIL TYPE OBJECTATION BOLIOUNESS	1 🗒 🛭	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F A Y	SE F	) <u> </u>	SCT FC	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	/BC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
		S. O.	FR/	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-42.8				81.3-81.6' - Fracture, 30-80 deg, rough,		Limestone	
			2	undulating, orientation angle increasing with	口	- 77.7-79.7' - yellowish gray, (5Y 7/2),	-
l _				depth	Н	very fine grained, moderate to strong	_
				82.0' - Fracture, horizontal, rough, undulating,		HCl reaction, medium strong (R3),	Driller's Remark: (87.0-
			>10	tight - 82.35-82.5' - Fracture, 20-30 deg, rough,	Н	<ul> <li>voids to 1/16" on 20-25%, cavities to 3/4" on 1-2%, occasional hair-line</li> </ul>	90.0') open hole in rock, - rods dropped one more
-	R9-NQ			undulating, tight	╁┼╏	incipient fracture traces	foot when released
-	5 ft	37	1	82.8' - Fracture, 0-5 deg, rough, undulating,	Ш	No Recovery 79.7-80.0'	87-88' void -
-	88%			open	H	Limestone 80.0-82.9' - light olive gray, (5Y 5/2),	88-89.5' solid
				85.1' - Fracture, 0-10 deg, rough, undulating, open		- fine grained, mild HCl reaction,	89.5-91' void Driller's Remark: Lost –
				85.35-85.4' - Fracture, 5-10 deg, rough,	Н	medium strong (R3), voids to 1/16"	circulation at 87.0'
-			NR	undulating, open	Ш	on 20-25%, cavities	R9: 9 minutes
	-			86.1' - Fracture, horizontal, rough, undulating, tight	H	<ul> <li>1-3/16"-3/4"except at 80.9-81.0', larger cavities 1-3/16x1-3/16x3/8" on</li> </ul>	-
90 <u> </u>	90.0			86.5-87.2' - Fracture zone		>5% , trace fossil molds/casts	
1 "-"-				87.5' - Fracture, 5 deg, rough, undulating,	₽₽	No Recovery 82.9-85.0'	-
1 -				open	Ш	Limestone	
					Н	85.0-86.6' - moderate yellowish brown, (10YR 5/4), fine grained,	Driller's Remark: 91.0-95.0'
					H	moderate HCl reaction, weak to	open, minimal resistance – as sporadic stringers of
-	R10-NQ			-	Ш	medium strong (R2 to R3), voids to	rock, or small breccia
-	5 ft	0	NR		+	_ 1/16" on 15-18%, cavities to 3/4" on	clasts, yield rig chatter -
_	0%					<5%, fossiliferous (molds and casts) 86.6-88.1' - pale olive brown, (5Y	_
_					Н	_ 5/6), fine grained, weak to medium	_
						strong (R2 to R3), void spaces over	
-	1				Н	<ul><li>25% of surface, solution cavities over</li><li>15-20%, trace organics, iron oxide</li></ul>	R10: 2 minutes
-	05.0			•		patina on some cavities, fossiliferous	-
95 <u> </u>	95.0					(molds/casts)	_
-					H	No Recovery 88.1-103.0'	_
_						_	_
					Н		Driller's Remark: 95.0-
					Ш	_	103.0', rods were – apparently sitting on a
-	R11-NQ			•	H	<u>-</u> T	small piece of rock; when
-	5 ft	0	NR			_	connection was made the -
_	0%				₽₩	_	rods free fell to 103.0' with
1 -					Ш	_	no recovery
1					$\vdash\vdash\vdash$		
	]				Ш		R11: Run time not
100	1000				Ш	_	recorded -
100_ -57.8	100.0			_	Ш		
-				-	$\Box$	_	-
1 -	[				┟┼┨		_
			NR		Щ		
1			INE		$\vdash \vdash \vdash$		]
1 -	R12-NQ				口	_	1
1 -	5 ft	0			╂┼╂	_	-
-	14%				口	_	Actual recovery was from
1 -			0		H	_	103.0-103.7'
1			NR		Ш		R12: 3 minutes
105	105.0		' '	-	┧	_	<u> </u>
105	105.0				$\Box$		



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	B-30	SHEET	7 OF 9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.1 N, 458444.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

COKING	IVIL IT IOD A	ND L	ZUIFIV	IENT: CME 55 S/N 299205, mud rotary, NQ tools, HW c	asiriy		ORIENTATION : Vertical
WATER	LEVELS: 2.4	ft bg	s on 5	/03/07 START : 5/2/2007 END : 5/	6/200	LOGGER : D. Roraback	
>	· ·			DISCONTINUITIES	ני	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		Ś	DESCRIPTION	FOG	ROCK TYPE, COLOR,	
표상인	Z'A'A'ER'A	(%	굶		일	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
ŦĂŔ	RE F GTF SOV	(%) Q	FCT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	lBO	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
	Service	g	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-62.8	014			10-11-	+ "	Limestone	
-			0	105.1' - Fracture, horizontal, rough, undulating, open		- 103.0-103.7' - yellowish gray, (5Y	_
I _				105.25' - Fracture, 0-5 deg, rough,	Н	7/2)), strong HCl reaction, extremely	00 0 11 1 -1 105 0
				undulating, open		weak to very weak (R0 to R1),	SC-2 collected at 105.9- 107.2'
_			0	105.5' - Fracture, horizontal, rough,	Н	<ul> <li>medium grained, sandy texture, voids (&lt;1/16") over 1-2% of surface, fossils</li> </ul>	107.2
-	R13-NQ			undulating, open 105.6-105.8' - Fracture zone	H	absent	-
-	5 ft	27	5	107.05' - Fracture, 5 deg, rough, undulating,	ш	No Recovery 103.7-105.0'	-
-	64%		4	tight	H	Limestone	_
			_1_	107.4' - Fracture, 40 deg, rough, undulating,		105.0-105.6' - Same as 103.0-103.7' - 105.6-108.2' - light olive gray to pale	_
				open 107.5' - Fracture, 0-5 deg, rough, undulating,	Н	yellowish brown, (5Y 5/2 to 10YR	
			NR	open	Ш	6/2), mild to moderate HCl reaction,	R13: 12 minutes
140	440.0			107.7' - Fracture, 0-2 deg, rough, undulating,	Н	<ul> <li>weak (R2), voids (&lt;1/16") over 5% of surface, cavities (3/8" to 3/16") &lt;1%,</li> </ul>	-
110_ -67.8	110.0			open 108.0' - Fracture, 0-2 deg, rough, undulating,		trace fossil molds/casts	Water level 1.9' below
37.3				open	$oldsymbol{arphi}$	No Recovery 108.2-120.0'	ground surface 5/5/07 -
1 -					Ш	 <del> </del>	<sup>-</sup>
					Н		
					Ш	_	1
_	R14-NQ			-	ш	-	
-	5 ft	0	NR	-	Н	=	-
_	0%			-			_
_					H	_	_
					Н		R14: 4 minutes
115	115.0					_	1
-72.8	113.0			<del>-</del>	Н	_	No recovery, pulled cutter
-						-	casing and found core -
_					₽Н	_	fragment which may have
						_	been blocking inner core barrel; problem may be
					ш		due to inner barrel not
_	R15-NQ			-	Ш	=	locking properly
-	5 ft	0	NR		$\vdash$	-	Solution: Lift outer barrel – off bottom of hole before
-	0%				H	-	locking in inner barrel
-					П	_	-
_					Ы	 <del> </del>	-
					П	_	R15: 5 minutes
120	120.0				Ш		]
-77.8	0.0			120.21 Fracture 0.90 des assett atamed	П	Limestone	_
1 -			>10	120.2' - Fracture, 0-80 deg, smooth, stepped, open	$\vdash$	- 120.0-120.5' - light olive gray, (5Y	
-				120.3' - Fracture, horizontal, rough, stepped,	口	5/2), very fine to fine grained, moderate HCl reaction, medium	-
1 -				open	₽	- strong to strong (R3 to R4), voids to	-
1 _				120.3-120.5' - Fracture zone, angular to subrounded gravel-sized rock fragments	Ш	1/16" over <5% of surface, casts to	
	R16-NQ			120.5-120.75' - Fracture zone, 80 deg, rough,	$\vdash$	3/16" over <5%, fossils absent	]
1 -	5 ft 20%	0		undulating, tight, fracture plane bounded on		<ul> <li>120.5-121.0' - yellowish gray, (5Y 7/2), medium grained, strong HCI</li> </ul>	]
1 -	2070		NR	either end by horizontal, stepped to	₽₩	reaction, extremely weak to very	
-				undulating, rough, open bedding planes 120.75-121.0' - Fracture zone, subrounded	団	<ul> <li>weak (R0 to R1), sandy texture, very</li> </ul>	-
-				gravel-sized rock fragments	$\vdash$	similar to 103.0-103.7' No Recovery 121.0-125.0'	R16: 4 minutes
_				· ·	Ш	- 140 Necovery 121.0-120.0	K to: 4 minutes
125	125.0				Ш		



PROJECT NUMBER:

33884.FL

BORING NUMBER:

B-30

SHEET 8 OF 9

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.1 N, 458444.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

WATER LE	EVELS : 2.4	ft bgs	on 5/	03/07 START : 5/2/2007 END : 5/	6/200	LOGGER : D. Roraback	
≥0₽	<u> </u>			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-82.8 - - - - - -	R17-NQ 5 ft 58% 30.0	42	2 3 3 NR 4 3	125.25' - Fracture, 0-5 deg, rough, stepped, tight 125.6' - Fracture, 0-5 deg, rough, undulating, open 126.3' - Fracture, horizontal, rough, undulating, open 126.4, 126.5' - Fractures (2), horizontal, smooth, planar, open 127.2' - Fracture, 5-10 deg, rough, undulating, tight 127.7' - Fracture, 0-5 deg, rough, stepped, semi tight 127.75-127.9' - Fracture, 45-50 deg, rough, undulating, semi tight 130.1' - Fracture, 10-15 deg, rough, undulating, open 130.2' - Fracture, 5-10 deg, rough, undulating, open 130.4-130.5' - Fracture, 30-35 deg, rough, undulating, open		Limestone  125.0-126.7' - dusky yellow to yellowish gray, (5Y 6/4 to 5Y 7/2), fine to very fine grained, strong HCl reaction, extremely weak to weak (R0 to R2), fossiliferous  126.7-127.9' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (1/16") over 1-2% of surface, cavities sparse from 126.7-127.5', becoming more common with depth  No Recovery 127.9-130.0'  Limestone  130.0-131.2' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), voids (1/16") over 5-10% of surface, cavities to 3/8"	Water level 2' below ground surface on 5/6/07
	R18-NQ 5 ft 84% 35.0	45	4 3 NR	undulating, open 130.8' - Fracture, 0-5 deg, rough, undulating, open 131.2' - Fracture, 5-10 deg, rough, undulating, open 131.5' - Fracture, 0-5 deg, smooth, undulating, semi tight 131.9' - Fracture, horizontal, smooth, stepped 132.1' - Fracture, horizontal, rough, planar, open		<5%, fossiliferous (predominantly micro-fossils), very irregular, undulatory surface 131.2-131.85' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), voids <1%, cavities (<1/8") over 1% surface, rock surface generally uniform (slightly	SC-3 collected at 132.7- 133.5' - R18: 5 minutes -
-92.8 - - - - - - - - - 140	R19-NQ 5 ft 76% 40.0	22	3 3 5 NR	132.2-132.3' - Fracture zone, 0-50 deg, smooth to rough, planar to stepped, open 132.3' - Fracture, 0-5 deg, rough, undulating, open 132.7' - Mechanical break 133.5' - Fracture, 10 deg, rough, undulating, tight 133.6-133.75' - Fracture zone, 0-50 deg, smooth to rough, planar to stepped 133.75' - Fracture, 0-5 deg, rough, undulating, open 135.1' - Fracture, 0-60 deg, rough, stepped, open 135.4' - Fracture, 10 deg, smooth, stepped, open		undulatory), fossils absent, "silty textured"  131.85-132.2' - light olive gray, (5Y 5/2), dense, fine grained, moderate to strong HCl reaction, medium strong (R3), voids (<1/1/6") over  1-2% surface, cavities (3/8"x1/32") rare, fossils trace to absent  132.2-134.2' - moderate yellowish brown, (10YR 5/4), dense, moderate to strong HCl reaction, weak (R2), voids (1/16-1/8") over 5-10% of surface, cavities up to 3/8" over 2-3% of surface, fossils rare to absent, trace very dark or black	R19: 16 minutes
-97.8 -97.8 - - - - - - - - - - - - - - - - - - -	R20-NQ 5 ft 58%	20	4 4 >10 NR	135.9' - Fracture, 5 deg, smooth, stepped, tight 136.3-136.7' - Fracture, 70-75 deg, rough, undulating, tight 136.4' - Fracture, 5-10 deg, rough, undulating, tight 136.8' - Fracture, horizontal, rough, undulating, open 137.0' - Fracture, horizontal, rough, stepped to undulating to planar, open 137.2' - Fracture, 20 deg, rough, stepped, tight 137.4-137.55' - Fracture, 60 deg, rough, undulating, open			R20: 11 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	B-30	SHEET	9	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.1 N, 458444.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, HW casing

CORING	INETHOD A	AD EC	ZUIFIV	IENT: CME 55 S/N 299205, mud rotary, NQ tools, HW c	asing	_		ORIENTATION : Vertical
WATER	LEVELS : 2.4	ft bgs	s on 5	/03/07 START : 5/2/2007 END : 5/	6/200	)7	LOGGER : D. Roraback	
				DISCONTINUITIES		Γ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		(0	DESCRIPTION	SYMBOLIC LOG	H		<del> </del>
O P E	Z, Z, Z	_	FRACTURES PER FOOT	DESCRIPTION	_ □		ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
ACI	SET.	(%) Q	150	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	g	ı	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FR.	NG S	οD	REF	PLANARITY, INFILLING MATERIAL AND	Æ	ı	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ESE	822	œ	FR	THICKNESS, SURFACE STAINING, AND TIGHTNESS	ŝ	ı	CHARACTERISTICS	BROLO, IEOT REGOLIO, ETO.
-102.8				137.7' - Fracture, horizontal, rough,		T	Limestone	SC-4 collected at 146.7-
-			2	undulating, open	╁	╁	135.0-138.2' - variegated dusky	147.3'
-				138.0' - Fracture, horizontal, smooth, undulating, open	Ľ	1	yellow to grayish yellow to light gray to medium gray, (5Y 6/4 to 5Y 8/4 to	1 -
1 _			0	138.2' - Fracture, horizontal, smooth,	$oldsymbol{\perp}$	l	N7 to N5), very fine grained, strong	]
			0	undulating, tight	$\vdash$	1	HCl reaction, medium strong to	
1 7	R21-NQ			138.3' - Fracture, 5 deg, smooth, undulating,		t	strong (R3 to R4), voids (<1/16")	1 1
-	5 ft	57	4	tight	╨	╀	over 5% of rock surface, cavities up	1 -
-	92%			138.75' - Fracture, horizontal, smooth, planar,	$\pm \top$	╁	to 3-1/8" in length near bottom of	1 4
			3	tight 138.8' - Fracture, horizontal, smooth, planar,		1	section, some lined with black amorphous coating (possibly	
			3	tight	$\vdash$	F	hematite), large (5") cavity at	1
			2	140.1' - Fracture, 5-10 deg, smooth, planar,	tr	t	135.5-135.8', poorly fossiliferous	R21: 11 minutes
-				tight	F	1	(mold and casts)	-
	150.0		NR	140.3-140.5' - Fracture, 45-50 deg, smooth,	$\vdash$	Ł	Limestone ☐ 138.2-138.8' - yellowish gray to  ☐	
-107.8				planar, tight 140.55, 140.65' - Fractures (2), horizontal,	_	l	dusky yellow to olive gray, (5Y 7/2 to	Bottom of boring at 150.0'
1 7				rough, planar, open		Γ	5Y 6/4 to 5Y 3/2), fine grained, strong	below ground surface -
-				141.2' - Fracture, 5-10 deg, rough,	1	H	HCl reaction, weak to medium strong	1
-				undulating, tight	-	F	(R2 to R3), laminated, voids rare to	-
				141.3' - Fracture, 0-5 deg, rough, stepped,	4	L	absent, rare cavities (<1/16-1/8" diameter)	]
				open 141.8' - Fracture, horizontal, rough,		ı	No Recovery 138.8-140.0'	
1 7				undulating, open	1	Γ	Limestone	1 1
-				141.9-142.2' - Fracture zone, angular to	1	H	140.0-141.9' - yellowish gray to	1 1
-				subangular rock fragments	-	F	dusky yellow, (5Y 7/2 to 5Y 6/4), very	1 -
_				142.4, 142.6' - Fractures (2), horizontal,	1	L	fine to fine grained, strong HCl reaction, very weak to medium	]
				rough, undulating, open 142.7' - Fracture, horizontal, rough,		ı	strong (R1 to R3), voids to 1/16' over	
1 7				undulating, tight		r	<1% of rock surface, cavities	1 1
-				145.1' - Fracture, horizontal, rough,	1	H	(3/8"x1/8"x3/16") rare	I ⊣
_				undulating, open	4	F	141.9-142.9' - moderate olive brown,	1 4
				145.9-146.1' - Fracture, 60 deg, rough, undulating, tight		L	(5Y 4/4), fine grained, moderate HCl reaction, weak to very weak (R2 to	]
				147.3' - Fracture, horizontal, rough,		ı	R1), voids to 1/16" over 35-40%,	
				undulating, semi tight	1	r	cavities to 3/4" over <5%, some	1
-				147.7' - Fracture, 0-5 deg, rough, undulating,	1	H	fossils (molds/casts)	-
-				tight	4	F	No Recovery 142.9-145.0'	-
				147.8' - Fracture, horizontal, rough, undulating, open	1	L	Limestone 145.0-145.1' - moderate yellowish	]
				147.9-147.8' - Fracture zone, horizontal,			brown, (10YR 5/4), fine grained,	
1 1				rough, undulating	1	r	strong HCl reaction, extremely weak	1
-				148.1' - Fracture, horizontal, rough, stepped,	1	H	(R0), friable	-
-				open 148.2, 148.9, 149.27, 149.3' - Fractures (4),	-	F	145.1-147.9' - Same as 140.0-141.9' 147.9-149.2' - variegated very light	-
				horizontal, rough, undulating, open —	1	L	gray to yellowish gray, (N8 to 5Y 7/2),	
				149.4' - Fracture, horizontal, smooth, planar,		1	strong HCl reaction, extremely weak	7
1 7				open	1	r	to very weak (R0 to R1), very thinly	1
-					1	H	laminated with possibly	-
-					4	F	carbonaceous or clayey material from 147.9-148.35', voids (<1/16")	-
					1	L	over 2-3% rock, cavities rare to	]
						ľ	absent, trace fossil echinoderms	1
1 7					1	r	149.2-149.6' - dusky yellow, (5Y 6/4),	1
1 -					1	F	mild HCl reaction, medium strong	]
4				,	4	F	(R3), voids (<1/16") over 1-2%, cavities (1/16-1/8") rare, fossils rare	1 -
						1	to absent	1
						Γ	No Recovery 149.6-150.0'	1
1 -					1	r	Bottom of Boring at 150.0 ft bgs on	]
-				_	+	H	5/6/2007	<del> </del>
						L		<u> </u>



PROJECT NUMBER:	BORING NUMBER:				
338884 FI	B-30A	CHEET	4	OF 6	:

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.4 N, 458440.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 5-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 6.0 ft b	gs on 6/12	2/07 S	TART : 6/12/2007	END : 6/13/2007	LOGGEF	R : D.	Thomas
				STANDARD		SOIL DESCRIPTION			COMMENTS
8 € (±)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				ΙO	
		RECOVE	ERY (ft)	TEOT REGOETO	SOIL NAMI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6"	CONSISTEN	ECONTENT, RELATIVE D CY, SOIL STRUCTURE, N	MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
				(N)	0 001			S	
42.5					See B-30 for st 25.0'	hallow soils; no logging/o	coring until		0.0-10.0': Drilled with 5-7/8" tricone bit with no sampling or coring (EZ Mud)
_							-	1	-
_							-		_
_							-	1	_
_							-		_
_							-		_
_							-		_
_							-		_
_							-		_
5 37.5									_
37.5							-		-
-							-		
_							-		Driller's Remark. Encountered water at 6.0
_							-	-	-
_							-		-
-							-	-	-
-							-		-
-							-	$\mid \cdot \mid$	-
-							-	$\mid \cdot \mid$	-
10 <u> </u>							_	$\left\{ \ \ \right\}$	Driller's Remark: Hole has deviated at 10.0'
-							-	$\mid \cdot \mid$	-
-							-	$\left\{ \ \ \right\}$	10.0-25.0': 5" (PW) surface casing installed
-							-	$\ \cdot\ $	10.0-25.0': 5" (PW) surface casing installed with rock devil bit and cleaned out with 3-7/8"
-							-	$\ \cdot\ $	tricone bit 10.0-15.0': 30 minutes to drill
-							-	$\mathbf{I}$	-
-							-	1	-
-							-	1	-
-							-	1	-
- 45							-	$\ \cdot\ $	-
15 <u> </u>							_	1	 15.0-20.0': 14 minutes to drill
-							-	1	-
-							-	1	-
-							-	1	
-							-	1	
-							-	1	
-							-	1	
-							-	1	-
-							-	1	
20							-	1	
									-



PROJECT NUMBER:	BORING NUMBER:					
338884 FI	B-30A	CHEET	2	ΩE	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.4 N, 458440.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 5-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 6.0 ft bo	gs on 6/12	2/07 5	START : 6/12/2007 END : 6/13/2007 LO	GGER	: D.	Thomas
\				STANDARD	SOIL DESCRIPTION		Ö	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	CON NAME HOOG CROUD OVALOU COLOR		SYMBOLIC LOG	DEDTILOF CACINO DOULING DATE
A S E A T I O		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SOLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EPT LEV			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	'	YME	INSTRUMENTATION
<u>о</u> о ш				(N)			0)	20.0-25.0': 4 minutes to drill
-						-		-
-						-		-
-						-		-
-						-		-
-						-		-
-						_		-
-						-		-
_								_
25_	25.0							
17.5				0.40.00	Sandy Silt (ML) 25.0-26.2' - grayish orange, (10YR 7/4), moist, hard			
_		1.2	SS-1	9-19-22 (41)	very fine to coarse grained, nonplastic, rapid			_
-	26.5				dilatancy, mild to moderate HCl reaction, 35% very fine to coarse sand-sized, 10% fine gravel-sized, all			_
-					carbonate	_/		_
-						_		-
-						_		-
-						_		-
-						-		-
-						-		-
30 <u> </u>	30.0				Sandy Silt (ML)		Ш	_
-		1.0	SS-2	22-16-27	30.0-31.0' - Same as 25.0-26.2'	-		-
-	31.5			(43)		_	ш	-
-	01.0					-		_
-						-		Driller's Remark: Firm drilling, no chatter
								Driller's Remark: Easier drilling, no chatter
_								Driller's Remark: Trip out to begin HQ rock
-					Begin Rock Coring at 34.0 ft bgs See the next sheet for the rock core log			coring
35 7.5								_
7.5						_		-
-						_		-
-						-		-
-						-		-
-						-		-
-						-		-
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-						-		-
40						-		-
<b>—</b>								-



338884.FL B-30A

SHEET 3 OF 6

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.4 N, 458440.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WATER	LEVELS: 6.0	ft bgs	s on 6/	12/07 START : 6/12/2007 END : 6/	13/200	D7 LOGGER : D. Thomas	_
<b>≩</b> Ω⊋	<u>(%</u>			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	RQ	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
_	34.0		1	34.05' - Fracture, <5 deg, rough, undulating, tight	$\Box$	Limestone - 34.0-37.5' - moderate yellowish	Rock coring begins at 34'
35 7.5	R1-HQ		0	34.1-34.3' - Fracture, sandy silt	Ħ	brown, with lineations of gray to dark yellowish brown, (10YR 5/4, 10YR 4/2), fine grained, mild HCl reaction,	
-	3.5 ft 100%	90	0			weak (R2), 1/16-1/8" pebbles in matrix where gray, 20% 1/16" voids, crumbles to silt to sand-sized	- -
-	37.5		1	36.5' - Fracture, 0-20 deg, rough, undulating	H	particles from 34.1-34.3', cavities up to 3/4" from 35.9-37.5'  37.5-40.8' - Same as 34.0-37.5'	R1: 13 minutes
-			0	38.5-39.3' - Fracture zone, bounded by		- except dark yellowish brown, (10YR 4/2), 30% voids up to 1/16" and 2" x 1" cavities at 37.7', extremely weak	-
-	R2-HQ		2	horizontal to 20 deg rough and undulating surfaces 39.4' - Fracture, rough, undulating, tight	Ħ	(R0) at 38.5-39.3', voids up to 3/16" from 40.3-40.8'	-
40 2.5 -	5 ft 66%	57	2	40.2' - Fracture, 30 deg, rough, undulating		<u> </u>	
-						- No Recovery 40.8-42.5'	_
-	42.5		NR	-	$\exists$	-	R2: 2 minutes
_			0		H	Limestone 42.5-46.5' - dusky yellow, (5YR 6/4), fine grained, mild HCl reaction, very	-
-			0			weak (R1), 10% gray pebbles up to 1/4", 30% voids 1/16" with voids up to 3/16", many large voids are linear	-
45_ -2.5	R3-HQ 5 ft 80%	65	0	45.0' - Mechanical break			
-			2	45.8' - Fracture, 50 deg, rough, undulating, tight to healed		-	
-	47.5		NR	46.1' - Fracture, 50 deg, rough, undulating, tight to healed		No Recovery 46.5-47.5'	R3: 7 minutes
-			1	47.8' - Fracture, 75 deg, rough, undulating, stepped	H	Limestone  47.5-51.7' - dusky yellow to moderate yellowish brown, (5YR 6/4 to 10YR	
-			3	48.5, 48.8' - Fractures (2), horizontal, smooth, undulating, open		5/4), fine grained, moderate HCI reaction, strong (R4), very weak (R1) from 48.5-48.3', 15-25% 1/16" voids	-
50 -7.5	R4-HQ 5 ft 84%	75	0	49.45' - Fracture, horizontal, smooth, undulating, open	H	decreasing to 5-10% below 49.5' —	_
-			1	50.6' - Mechanical break, 10 deg, rough, undulating, tight	Ħ	-	SC-1 collected at 50.6- 51.7'
-	52.5		NR			No Recovery 51.7-52.5'	R4: 8 minutes
-			3	53.0-54.4' - Fracture or bedding plane, horizontal, rough, undulating, multiple		Limestone 52.5-53.0' - Same as 47.5-51.7' except with 1/16" voids increasing to 25%	-
				fractures			
Ц					1		l .



338884.FL B-30A

SHEET 4 OF 6

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.4 N, 458440.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WATER	LEVELS: 6.0	ft bg	s on 6/	12/07 START : 6/12/2007 END : 6/	13/200	)7 LOGGER : D. Thomas	
<b>₹</b> □₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B	E RL STH, OVEI	RQD(%)	TE S	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
ELEV ELEV	COR	α×	FRAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3×ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
- 00 ш	014	ш.	6		1 0)	Limestone	
	R5-HQ				$\Box$	- 53.0-54.1' - dusky yellow to moderate	-
55 <u> </u>	5 ft	50	0	_	Ш	yellowish brown, (5YR 6/4 to 10YR 5/4), extremely weak (R0), increasing	Driller's Remark: Softer
-	80%				╂┼┨	to very weak (R1) with depth,	drilling at 52.5-57.5'
_			1	55.65' - Mechanical break, 10 deg, smooth, planar	Ш	horizontal laminations/bedding planes 1/16" thick, often fractured	compared to previous
_				56.4' - Mechanical break, 60 deg	ш	along organic rich zones, some	R5: 3 minutes
_			NR	·	$\Box$	infilled with silts and clays 54.1-56.5' - Same as 52.5-53.0'	No. 5 minutes
_	57.5				$\vdash$	<ul> <li>except with increasing voids to</li> </ul>	_
-			2	57.6-57.9' - Fracture or bedding plane, horizontal, multiple fractures/bedding planes,	H	30-40% with depth No Recovery 56.5-57.5'	-
				infill of clay along one fracture	出	_ Limestone	_
-			3	58.5' - Fracture, 40 deg, rough, undulating, low angle, fracture through undulating wavy	₽	57.5-60.3' - Same as 52.5-53.0' except strong HCl reaction, few	-
				zone (3/4") of dark black organics (lignite)	Щ	organic laminations (minor)	_
60	R6-HQ 5 ft	47	5	organics clayey and "forky" on fracture surface	Ш	throughout, extremely weak to very weak (R0 to R1) and easily broken at	]
-17.5 -	92%		لنَّــا	59.3-60.1' - Bedding plane, multiple fractures	H	_ 59.1-60.2,	]
			2	60.1' - sharp discontinuity between silty	Ħ	60.3-61.0' - light olive gray, (5YR	_
				limestone material with organic and medium dark gray dense limestone	Ш	5/2), very fine grained, strong HCl reaction, strong (R4), 1-2" angular	Driller's Remark: Loss of water at 61.0'
			1	60.4-60.9' - Fracture, limestone fragments	Н	fragments, 5% voids (1/16")	R6: 13 minutes
	62.5		NR	60.9' - Fracture or mechanical break, 75 deg, rough, undulating, semi-planar		61.0-62.1' - yellowish gray, (5Y 7/2), very fine grained, strong HCl	
			1	61.0' - Fracture, 60 deg, rough, undulating		reaction, strong (R4), 5% voids	
			1	63.0' - Mechanical break, vertical, rough, non	Н	(1/16") increasing with depth to 25% with depth, several 1/4" voids	
				planar 63.6' - Fracture, 35 deg, rough, undulating,	Н	No Recovery 62.1-62.5'	SC-2 collected at 63.6-
			2	semi-planar	H	<ul> <li>Limestone</li> <li>62.5-67.5' - yellowish gray, (5Y 7/2),</li> </ul>	64.9'
65	R7-HQ			63.7' - Mechanical break, horizontal, rough, undulating	Ш	moderate to strong HCl reaction,	
-22.5	5 ft 100%	43	0		Ш	medium strong (R3), shallow 1/16" voids over 5%, some irregular black	
				0501.5	Ш	laminations, dark yellowish brown	_
_			0	65.8' - Fracture, horizontal, carbonate silt, friable	Ш	<ul> <li>(10YR 4/2) and extremely weak (R0) at 65.8-65.9', extremely weak (R0) to</li> </ul>	1
					$\mathbb{H}$	weak (R1) from 65.9-67.5',	R7: 4 minutes
-	67.5		1	66.8' - Fracture, 50 deg, rough, undulating, semi-planar fracture	Ħ	<ul> <li>increasingly competent with depth</li> </ul>	1
-				67.5-67.7' - Fracture zone, horizontal, rough,	H	67.5-71.5' - dark yellowish brown,	1
			2	undulating	Ш	<ul> <li>(10YR 4/2), fine grained, moderate</li> <li>HCl reaction, extremely weak to very</li> </ul>	1
-				68.3' - Fracture, horizontal 68.8, 68.95, 69.3, 70.0' - Bedding plane,	Н	weak (R0 to R1), friable, increasing	
-			3	horizontal, organics	囯	<ul> <li>% of 1/16" voids (up to 40%) at 68.7-71.7', fine organic laminations</li> </ul>	
70	R8-HQ			-	Ш	at 69.4' and 70.3'	
-27.5	5 ft 100%	70	1	69.9' - Fracture, 10 deg, rough, undulating,	H		-
-	100 /0			open	H	_	<u> </u>
-			1	70.9' - Fracture, friable, open	丗	-	-
-				71.5-71.7' - Fracture zone, friable	╂┼╂	<ul> <li>71.5-72.5' - Same as 67.5-71.5'</li> <li>except light olive gray, (5Y 5/2),</li> </ul>	R8: 10 minutes
-			2		口	moderate HCl reaction, weak (R2),	
-	72.5				団	small 1/16" voids decrease to 5%, also several 1/2" voids to cavities	-
-			1	72.9' - Fracture, 30 deg, rough, undulating,	╂┼┤	also several 1/2 VOIUS to Cavilles	-
-				includes several 1/2 to 1" elongated cavities	仠丨	-	-
					H		-
			<b>I</b>		$\perp$		



338884.FL B-30A

SHEET 5 OF 6

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.4 N, 458440.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WATER	LEVELS : 6.0	) ft bg	s on 6/	12/07 START : 6/12/2007 END : 6/	13/200	7 LOGGER : D. Thomas	
≥ D ≥	(%			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ATIC ATIC	E RU STH, OVEI	R Q D (%)	150 100 100 100 100 100 100 100 100 100	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR!	SOR	3 O E	-RA(	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	₩.	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
		_	0			Limestone	
75	R9-HQ			74.6, 74.8, 75.1, 75.3' - Fractures (4),	+	- 72.5-78.0' - light olive gray, (5Y 5/2),	-
75 <u> </u>	5 ft 100%	70	4	horizontal, rough, undulating, open	Ħ	fine grained, strong HCl reaction, weak to medium strong (R2 to R3),	
-	100%			75.7.50 5 4 40 4 5 4 4 4	丗	- shallow 1/16" voids over 5%, 1/2" to 1" cavities, numerous small (1/8")	-
-			2	75.7-75.9' - Fractures (2), horizontal and vertical, rough, undulating to stepped,	Ш	casts/molds, extremely weak (R0)	-
-				silt-sized infilling	╁┼┼	<ul> <li>silt-sized carbonate material and trace organics at 74.6-75.3', fewer</li> </ul>	R9: 9 minutes
-	77.5		3	76.6' - Fracture, 50 deg, rough, undulating	Ш	large cavities at 75.3-77.5'	-
-	77.5			77.3' - Fracture, horizontal and 60 deg, rough, stepped	ш	-	-
			3	77.5' - Fracture, horizontal, smooth,	╁	- 78.0-78.5' - moderate yellowish	
-				undulating 77.6' - Fracture, horizontal, smooth,	H	<ul> <li>brown, (10YR 5/4), moist, mild HCI reaction</li> </ul>	
-			1	undulating, tight		78.5-82.1' - moderate yellowish	-
80	R10-HQ			78.0-78.5 <sup>†</sup> - angular fragment 1/2" with fines infilled	$\Box$	<ul> <li>brown, (10YR 5/4), fine grained, strong HCl reaction, medium strong</li> </ul>	
-37.5	5 ft 92%	53	0	79.2' - Fracture, 30 deg, rough, undulating,	出	(R3), 20% 1/16" voids, fossiliferous	-
-	32 /0			tight, 1/16" relief 80.0-80.2' - Mechanical break	╆	with some cavities up to 1/2"	
			2	80.9' - Fracture, 20 deg, rough, undulating,	Ħ	-	-
			1	3/8" relief 81.4, 81.9' - Fractures (2), horizontal and 40	ш	-	R10: 6 minutes
	82.5		NR	deg, rough, angular fragments to 1-1/2", open	Ш	- No Recovery 82.1-82.5'	
†	02.0				H	Limestone	
			2	83.1' - Fracture, 75 deg, rough, undulating	텎	<ul> <li>82.5-86.6' - moderate yellowish brown, (10YR 5/4), fine grained,</li> </ul>	
				83.2' - Fracture, 10 deg, rough, undulating,	Ħ	moderate HCl reaction, medium	
			0	organics	丗	<ul> <li>strong (R3), 25% 1/16" voids, many up to 1/4" cavities and 1" cavities</li> </ul>	1
85	R11-HQ			04.0.05.41.5==+0===(0)	Ш	with mold at 83.8'	Driller's Remark: Rods
-42.5	5 ft 82%	53	3	84.8, 85.1' - Fractures (3), rough, undulating, — 1/16" thick, organic laminations	H	_	dropped at 84.5-85.5' —
				84.9' - Fracture, 30 deg	Ш	-	
			3	86.0' - Fracture, 75 deg, rough, undulating,	団	-	Driller's Remark: Losing
				minor black/gray staining on fracture surface 86.3, 86.4' - Fractures (2), horizontal, rough,	Ш	No Recovery 86.6-87.5'	fluid at 86.0-87.5' – R11: 10 minutes
	87.5		NR	undulating	$\mathbb{H}$	-	Driller's Remark: Rods
	-			87.7' - Fracture, horizontal, rough, undulating		Limestone	dropped at 87.5-87.9', rods - dropped before drilling
1			1		泔	<ul> <li>87.5-88.7' - Same as 82.5-86.6' except yellowish gray, (5Y 7/2), with</li> </ul>	··
1			2	88.5' - Fracture, horizontal, rough, undulating,	Ш	voids up to 1/4" diameter over 10% and many up to 3/4" cavities (still	1
1				iron staining 88.6' - Fracture, horizontal, rough, undulating	$\mathbb{H}$	10% small voids), rock becomes	1
90	R12-HQ 5 ft	13			Щ	fractured at 88.5, fragments covered with fine grained material, no	]
-47.5	5 π 24%	13		_	川	sediment infilling in molds/cavities	
			NR		Ы	No Recovery 88.7-93.5'	Driller's Remark: Rods dropped at 90.5-92.5'
]					Ы	_	
]					H	_	R12: 2 minutes
]	92.5				川	_	Driller's Remark: Difficulty setting core barrel due to
			NR		Ш	_	sediment in drill pipe
					Ш	_	
				93.5-94.5' - Fracture, traces of lignite	Ш		_



338884.FL B-30A

## **ROCK CORE LOG**

SHEET 6 OF 6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723272.4 N, 458440.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WATER	LEVELS: 6.0	ft bgs	s on 6/	12/07 START : 6/12/2007 END : 6	/13/200	7 LOGGER : D. Thomas	_
≥∩ ≘	- (ŷ			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
ANE (	ZAN ZAN Q⊗D		SL	DESCRIPTION	CLO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) O	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ECC	R Q D	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Y ME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ΔОШ	Olk	IĽ.	>10		S	Limestone	Driller's Remark: Logged
1 -	R13-HQ				₽	- 93.5-97.5' - yellowish gray, (5Y 5/2),	hole before starting at 93.5' -
95 <u> </u>	5 ft	45	0	94.7' - Fracture, 10 deg, rough, undulating,	世	fine grained, strong HCl reaction, very weak (R1), weakly cemented,	(6 inches past where previous run ended)
-52.5	80%			open	₽₩	- friable, voids 1/16" over 10%, fossiliferous with voids/cavities from	previous furi criaca)
-			3	96.0, 96.2, 96.3' - Fractures (3), horizontal	-		
-				and 50 deg, rough, undulating, open	R13: 1 minute		
1 -			1	97.0' - Fracture, 45 deg, rough, undulating,	╆	-	1713. Trimide
4	97.5			open	++	97.5-100.2' - Same as 93.5-97.5'	-
			1	97.5-97.8' - Fracture, angular 1"-2" fragment 97.9' - Fracture, 50 deg, rough, undulating	$\Box$	- except 1/16" voids increase to 15%,	-
				97.9 - Fracture, 50 deg, rough, undulating	₽	unconsolidated, silt-sized, carbonate material at 100.0-100.2'	-
			2	98.9' - Fracture (2), 40 deg and vertical,	₽		-
	R14-HQ			rough, undulating	幵	-	-
100_ -57.5	5 ft	28	5	99.4-100.0' - Fracture zone, horizontal and vertical, non planar, friable	┲		_
-57.5	54%			-, - r, <del></del>	丗	No Recovery 100.2-105.1'	-
					╁┼	_	-
			NR		$\blacksquare$	_	R14: 1 minute
					$\boxminus$	_	K14. I IIIIIIule
1 +	102.5				丗	-	-
1 -					₽	-	-
1 -					$\Box$	-	-
1 -			NR		柙	-	-
1 -	 R15-HQ				坩	-	-
105 -62.5	5 ft	22		405.4.405.01.5	+	- <u>.</u> . ,	_
02.0	48%		>10	105.1-105.8' - Fracture zone	+	Limestone 105.1-108.7' - pale greenish yellow,	-
1 -			>10	105.7' - Fracture, horizontal, rough, undulating, tight	Ħ	yellowish gray, (10Y 8/2, 5Y 7/2),	-
1 -				106.3' - Fracture, horizontal, open, does not	丗	strong HCl reaction, no voids except for one 1/16" fossil mold, extremely	R15: 2 minutes
-			0	fit together	╁╫	weak (R0) and friable at	- 10. 2 minutes
	107.5				幵	105.8-106.3', very weak (R1) and friable with several elongate fossil	-
-			2		口	_ molds at 106.3-108.7'	-
-					丗	-	-
-			2		$\Box$	_ 108.7-110.8' - light olive gray, (5Y 5/2), fine grained, no to mild HCl	-
<b>I</b>	 R16-HQ				$\Box$	reaction, medium strong (R3), 5%	-
110_ -67.5	5 ft	38	4	_	$\Box$	voids (1/16" in size), less consolidated (R1) at fractures from	_
	100%				丗	- 110.0-110.4' at fractures	-
			>10		₩	- 110.8-112.3' - Same as 108.7-110.8'	-
			$\vdash$		╁╀	except friable and broken 112.3-112.5' - Same as 108.7-110.8'	R16: 6 minutes
			>10		口	except with several elongate fossils	-
+	112.5				卄	Bottom of Boring at 112.5 ft bgs on	-
-					┨╏	- 6/13/2007	-
-					┨╏	-	-
					+		
1							



PROJECT NUMBER:	BORING NUMBER:	
338884.FL	CT-01	SHEET 1 OF 7

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724860.4 N, 455975.6 E (NAD83)

ELEVATION: 43.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

### STANT 1282007   STANT 1282007   COGGE 1. 1 Botton, J. Schaeffer	DRILLING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit  ORIENTATION : Vertical									
SAMPLE INTERVAL (P)   PERCENTAGE   PERCENT						·				
Sample   Interval (ii)   Pelectrial (io)   Pelectrial (io)   Soil   Name   LISCS GROUP SYMBOL, COLOR, MINISTRUME (IO)   Soil	WATER	LEVELS	: 9.5 IL DC	15 OH 12/3						
1.1   SS-1   1.1-2   (3)   Topsoil	<b>≥</b> 9€	SAMDLE	: INITED\/A	I /ft\	PENETRATION	GOIL BESSE III TION				
1.1   SS-1   1.1   SS-1   1.1   SS-1   1.1   SS-1   1.1   SS-1   1.1   SS-1	SELC ON (	OAWII EE		, ,	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,				
1.1   SS-1   1.1-2   (3)   Topsoil	FAC		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR ON DRILLING FLUID LOSS, TESTS, AND				
1.1   SS-1   1.1   SS-1   1.1   SS-1   1.1   SS-1   1.1   SS-1   1.1   SS-1	SUR			#TYPE		CONSISTENCT, SOIL STRUCTURE, MINERALOGY				
1.1   SS-1   (3)	43.4	0.0				- 10p30ii				
1.5 (a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	-		1.1	SS-1						
Sandy Lean Clay (CL)   Sandy Lean Clay (CL)	-	1.5			(3)	O.25-1.1' - very light gray, white and light brownish				
Sandy Lean Clay (CL)   S.0.5.3' -motified very light gray, gray/sh yellow, and talk yellowish orange, (Nb. 5' 84.4, and 10'YR 6'6), moist, medium plasticity, slow dilatancy, (25-30's very fine silica sand (35') silva Sand (35	-	1.5				│ \ gray, (N8, N9 and 5YR 6/1), dry to moist, very loose, │ │ │ │ │				
Sandy Lean Clay (CL)   S.3 - metitled very light gray, gray/sh yellow, and dark yellowish orange, (NB, SY 8/4, and 10/18 6/6), moist, medium plasticity, slow dilatancy, (S.5-0% every fine silica sand Sity Sand (SM) (SM) (SM) (SM) (SM) (SM) (SM) (SM)	-									
38.4  1.0 SS-2  2.3-4 (7)  6.5  1.0 SS-2  2.3-4 (7)  6.5  5.5  5.5  1.0 SS-2  2.3-4 (7)  6.5  5.5  5.5  6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  5.5  6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  1.0 SS-3  1.0 SS-3  3.5-6 (11)  1.1.5  1.0 SS-4  1.0 SS-5  1.0 SS-6  1.0 SS-6  1.0 SS-6  1.0 SS-8  1.0 SS-8  1.0 SS-8  1.0 SS-8  1.0 SS-9	_					-				
38.4  1.0 SS-2  2.3-4 (7)  6.5  1.0 SS-2  2.3-4 (7)  6.5  5.5  5.5  1.0 SS-2  2.3-4 (7)  6.5  5.5  5.5  6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  5.5  6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  1.0 SS-3  1.0 SS-3  3.5-6 (11)  1.1.5  1.0 SS-4  1.0 SS-5  1.0 SS-6  1.0 SS-6  1.0 SS-6  1.0 SS-8  1.0 SS-8  1.0 SS-8  1.0 SS-8  1.0 SS-9	-									
1.0   SS-2   2.3-4   (7)   5.0-5.3 motiled very light gray, grayish yellow, and dark yellowish orange, (Ns, SY 94, and 10YR 6/6), which redium plasticity, slow dilatancy, 25-30% very fine silica sand   Sility Sand (SM)   5.3-6.0" - pale yellowish brown to dark yellowish brown, to dark yellowish brown, to dark yellowish brown, to dark yellowish brown, to dark yellowish brown, dark yellowish b	_									
1.0   SS-2   2.3-4   (7)   5.0-5.3 motiled very light gray, grayish yellow, and dark yellowish orange, (Ns, SY 94, and 10YR 6/6), which redium plasticity, slow dilatancy, 25-30% very fine silica sand   Sility Sand (SM)   5.3-6.0" - pale yellowish brown to dark yellowish brown, to dark yellowish brown, to dark yellowish brown, to dark yellowish brown, to dark yellowish brown, dark yellowish b	-									
38.4  1.0 SS-2  2.3-4 (7)  6.5  1.0 SS-2  2.3-4 (7)  6.5  5.5  5.5  1.0 SS-2  2.3-4 (7)  6.5  5.5  5.5  6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  5.5  6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  1.0 SS-2  2.3-4 (7)  5.5.6.5  1.0 SS-3  1.0 SS-3  3.5-6 (11)  1.1.5  1.0 SS-4  1.0 SS-5  1.0 SS-6  1.0 SS-6  1.0 SS-6  1.0 SS-8  1.0 SS-8  1.0 SS-8  1.0 SS-8  1.0 SS-9	-									
10 10.0 SS-2 (7)  10 10.0 SS-2 (7)  10 10.0 SS-3 (8)  10 10.0 SS-3 (11)  10 10.0 SS-3 (8)  10 10.0 SS-3 (11)  11.5 15.0 SS-4 (9)  11.5 15.0 SS-4 (9)  11.5 15.0 SS-4 (9)  11.5 15.0 SS-4 (9)  11.5 15.0 SS-4 (9)  11.5 15.0 SS-4 (9)  11.5 15.0 SS-4 (9)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 15.0 SS-4 (11)  11.5 I5.0 SS-3 I5.0 SS-3 I5.0 SS-3 I1.0 II.0 II.0 II.0 II.0 II.0 II.0 II.0		5.0				Sandy Lean Clay (CL)				
1.0   SS-2   C(7)   Carly Rellowish orange, (NS, 5Y 8/4, and 10YR 6/6), medium plasticity, slow dilatancy, (25-30% very fine silica sand (10YR 9/2), wet, loose, very fine loo	- 50.4			0.5	2-3-4	5.0-5.3' - mottled very light gray, grayish yellow, and				
25-30% very fine silica sand Silty Sand (SM) 53-6 0°- pale yellowish brown to dark yellowish brown, (10YR 6/2 to 10YR 9/2) wet, loose, very fine to fine grained, 20% nonplastic fines    10	_		1.0	SS-2						
Silty Sand (SM)   5.3-6.0 - pale yellowish brown to dark yellowish brown, (10YR 6/2 to 10YR 9/2), wet, loose, very fine to fine grained, 20% nonplastic fines   10.0   33.4   0.9   SS-3   3-5-6   10.0-10.85' - very pale orange, pale yellowish brown, dark yellowis	_	6.5				\\noist, medium still, medium plasticity, slow dilatancy,     -     -     -				
10   10.0   10.0   33.4   0.9   SS-3   3-5-6   (11)   11.5   15.0   28.4   1.0   SS-4   3-4-5   (9)   16.5   SS-4   3-4-5   (9)   16.5   SS-4   3-4-5   (9)   16.5   SS-4   3-4-5   (9)   16.5   SS-4   SS-	_					Silty Sand (SM)				
to fine grained, 20% nonplastic fines    10						\\\( \) 5.3-6.0' - pale yellowish brown to dark yellowish \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				
33.4  0.9 SS-3  3-5-6 (11)  11.5  11										
33.4  0.9 SS-3  3-5-6 (11)  11.5  11										
33.4  0.9 SS-3  3-5-6 (11)  11.5  11										
33.4  0.9 SS-3  3-5-6 (11)  11.5  11						] ]				
11.5  15.0  28.4  1.0  SS-4  3.4-5 (9)  10.0-10.85' - very pale orange, pale yellowish brown, 10YR 8/2, 10YR 6/2, 10	10	10.0				] ]				
dark yellowish brown, (10YŘ 8/2, 10ÝŘ 6/2, 10Ý	33.4									
11.5  15.0  1.0  SS-4  3.4-5 (9)  Poorly Graded Sand With Silt (SP-SM) 15.0-16.0' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, silica sand, 10% nonplastic fines			0.9	SS-3						
Poorly Graded Sand With Silt (SP-SM)  1.0 SS-4  3-4-5 (9)  Poorly Graded Sand With Silt (SP-SM) 15.0-16.0' - pale yellowish brown, (10) R 6/2), wet, loose, very fine to fine grained, silica sand, 10% nonplastic fines		11.5			(11)	$\sqrt{4/2}$ , wet, medium dense, very fine to fine grained, $\sqrt{1}$				
Poorly Graded Sand With Silt (SP-SM)  1.0 SS-4  3-4-5 (9)  Poorly Graded Sand With Silt (SP-SM)  15.0-16.0' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, silica sand, 10% nonplastic fines						(5-15% nonplastic fines, varies in beds				
Poorly Graded Sand With Silt (SP-SM)  1.0 SS-4  3-4-5 (9)  Poorly Graded Sand With Silt (SP-SM)  15.0-16.0' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, silica sand, 10% nonplastic fines						1 1				
Poorly Graded Sand With Silt (SP-SM)  1.0 SS-4  3-4-5 (9)  Poorly Graded Sand With Silt (SP-SM)  15.0-16.0' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, silica sand, 10% nonplastic fines	_					1 1				
Poorly Graded Sand With Silt (SP-SM)  1.0 SS-4  3-4-5 (9)  Poorly Graded Sand With Silt (SP-SM)  15.0-16.0' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, silica sand, 10% nonplastic fines	-					1 1				
Poorly Graded Sand With Silt (SP-SM)  1.0 SS-4  3-4-5 (9)  Poorly Graded Sand With Silt (SP-SM)  15.0-16.0' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, silica sand, 10% nonplastic fines	-					- <del>-</del>   -				
Poorly Graded Sand With Silt (SP-SM)  1.0 SS-4  3-4-5 (9)  Poorly Graded Sand With Silt (SP-SM)  15.0-16.0' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, silica sand, 10% nonplastic fines	-									
Poorly Graded Sand With Silt (SP-SM)  1.0 SS-4  3-4-5 (9)  Poorly Graded Sand With Silt (SP-SM)  15.0-16.0' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, silica sand, 10% nonplastic fines	15	15.0				<del> </del>				
1.0 SS-4 3-4-5 (9) 15.0-16.0' - pale yellowish brown, (10YŔ 6/2), wet, loose, very fine to fine grained, silica sand, 10% nonplastic fines		15.0								
16.5 (9) nonplastic fines	-		1.0	SS-4		15.0-16.0' - pale yellowish brown, (10YR 6/2), wet,				
	-	46-	'.0	00-7	(9)					
	-	16.5								
	-									
20	-									
20	-									
20	-									
20	-									
20	-									
	20					<del>                                     </del>				



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-01	SHEET	2	OF	7	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724860.4 N, 455975.6 E (NAD83)

DRILLING METHOD AND EQUIPMENT: CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit

ELEVATION: 43.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

					CTART : 10/0/2007	•		ONIENTATION : Vertical
WATER	LEVELS	. 9.3 II DQ	js 011 12/3		START : 12/2/2007 END : 12/3/2007 SOIL DESCRIPTION	LUGGER	1.	Borton, J. Schaeffer  COMMENTS
≩Q≆	CAMPIE	INTERVA	1 (#)	STANDARD PENETRATION	SOIL DESCRIPTION		90	GOIVIIVILINIG
N (	SAMPLE			PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMB	OL. COLOR.	IC L	DEPTH OF CASING, DRILLING RATE,
H B		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE	DENSITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE,	MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
23.4	20.0			(14)	Silty Sand (SM)		111	
-	20.0		CC E	6-5-5	20.0-21.05' - Same as 15.0-16.0' exce	ept 15-20% -		-
-		1.1	SS-5	(10)	nonplastic fines	<del>_</del>	Ш	-
_	21.5					-		-
_						_		_
_						_		_
						_		_
						_		
25	25.0					<del>-</del>	l	1
18.4					Poorly Graded Sand With Silt (SP-S	M)	H	1
-		0.9	SS-6	3-4-6	25.0-25.9' - very pale orange, pale yel (10YR 8/2, 10YR 6/2), wet, loose, ver	lowish brown, -	诎	1
-	26.5			(10)	grained, silica sand, 7% nonplastic fin	es /		1
-	20.5							1
-						_		-
-						-		-
-						-		-
-						=		-
-						-		-
-						-		-
30 <u> </u>	30.0				Oilte Orand (ON)		1.11.	_
13.4				4-4-6	Silty Sand (SM) 30.0-31.05' - very light gray, (N8), mo	ist to wet. loose		_
_		1.1	SS-7	(10)	very fine to fine grained, silica sand, 1	5-20%		_
_	31.5			` ,	nonplastic fines, trace organics			_
						_		
						_		
						_	1	1
1 7						-		1
						_	1	1
35	35.0					-		1
8.4	55.0				Silty Sand (SM)		111	-
-		1.2	SS-8	2-2-2	35.0-36.2' - Same as 30.0-31.05' exce	ept very loose -		-
-	00.5	· ·		(4)		_	Ш	-
-	36.5					-		
-						-		-
-						-		-
-						-		-
-						-		-
-						_		_
						_		_
40								



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724860.4 N, 455975.6 E (NAD83)

ELEVATION: 43.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 9.5 ft b	gs on 12/3	3/07	START : 12/2/2007 END : 12/3/2007 LOGGER	R : T.	Borton, J. Schaeffer
				STANDARD	SOIL DESCRIPTION	G	COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		CLO	DEDTIL OF GACING DRIVING DATE
H BE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30LIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
3.4	40.0	1.5	SS-9	3-5-5 (10)	Sandy Fat Clay (CH) 40.0-41.5' - very light gray to medium light gray, (N8 to N6), wet, medium stiff, medium to high plasticity, slow dilatancy, 40-45% very fine to fine silica sand		Driller's Remark: Change in drilling at 44.5' (stiffer) -
- - - -	41.5				slow dilatancy, 40-45% very line to line silica sand		- - - - - -
45	45.0				A. (A.)		_
-1.6 - -	46.5	1.5	SS-10	5-8-9 (17)	Fat Clay (CH)  45.0-45.3' - yellowish gray, (5Y 8/1), moist, medium stiff, high plasticity, no to slow dilatancy, no HCl reaction  Fat Clay With Sand (CH)		- -
- - - -					45.3-46.3' - mottled very light gray and light bluish gray, (N8 and 5B 7/1), moist, medium stiff, high plasticity, no to slow dilatancy, mild HCl reaction, fine to coarse grained particles are both angular carbonate grains and rounded black and brown grains  Fat Clay With Poorly Graded Sand (CH)  46.3-46.4' - light greenish gray, (5 G 8/1), moist, medium stiff, high plasticity, no dilatancy, no HCl reaction, 1/2" lens of very fine fine silica sand at 46.5'		- - - - -
50 -6.6 -	50.0	1.5	SS-11	4-4-3 (7)	Fat Clay (CH)  46.4-46.5' - brownish gray, (5Y 8/1), moist to wet, medium stiff, high plasticity, no dilatancy, no HCI reaction  Silty Sand With Fat Clay (SM)		_ - -
- - - -	01.0				50.0-51.5' - yellowish gráy, (5Ý 7/2), wet, loose, very fine to fine grained, no HCl reaction, silica sand, 20-25% nonplastic to low plastic fines (amount and plasticity vary with depth), fat clay (CH) lenses occur up to 1/4" thick from 50.0-51.3' light bluish gray (5B 7/1), highly plastic, no HCl reaction		- - - - - -
55 <u> </u>	55.0				Cillar Cond Millah Clay (CM)	1111	_
-11.6	56.5	1.5	SS-12	1-2-4 (6)	Silty Sand With Clay (SM) 55.0-56.5' - yellowish gray, (10YR), wet, loose, very fine to fine grained, 20-30% nonplastic to low plastic fines, 15% of sample consists of 1/2" to 1", sandy fat clay (CH) lenses, same as 50.0-51.5', no HCl reaction		- - -
-					in clay materials /		- - - -
60							



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724860.4 N, 455975.6 E (NAD83)

ELEVATION: 43.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

						y, auto hammer, AWJ rods,				ORIENTATION: Vertical
WATER	LEVELS	: 9.5 ft b	gs on 12/3	3/07 S	START : 12/2/2007	END : 12/3/2007	LOGGE	R:	<u>г. В</u>	Borton, J. Schaeffer
3000				STANDARD PENETRATION		SOIL DESCRIPTION		بر 📙	۶ <b>إ</b>	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	AL (ft)	TEST RESULTS	COU NABAT	LICCO CECLID CVMDOL	COLOR		<u>ا</u> ک	DEDTH OF CASING DOULING DATE
H S S S S S S S S S S S S S S S S S S S		RECOVE	ERY (ft)		MOISTURE C	USCS GROUP SYMBOL, ( CONTENT, RELATIVE DEN	COLOR, ISITY OR	1 2		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EVA			#TYPE	6"-6"-6"		Y, SOIL STRUCTURE, MIN		1 2		INSTRUMENTATION
SE				(N)				Ó	n l	
-16.6 - -	60.0	1.4	SS-13	3-4-6 (10)	60.0-60.6' - Samo √ 60% clayey sand	yey Sand And Fat Clay ( e as 50.0-51.5 and 55.0- (SC), mottled yellowish ( YB 7/2 and 5Y 5/2), mois	56.5' except gray and			- -
-5 -21.6 -21.6 -21.6	65.0 65.0	0.0	\SS-14)	50/0 (50/0")	very fine to fine g 40% fat clay (CH medium stiff, high reaction  Organic Soil (OL 60.6-61.0' - dusk stiff, medium plat appearance, 1/4" Silty Sand With 61.0-61.4' - light grained, 20% nor	y brown, (5YR 2/2), mois sticity, slow dilatancy, shi sand lens at 60.9' Organics (SM) olive gray, (5Y 5/2), wet, nplastic fine organics, 1/2 iil (OL) at 61.3-61.4' 25% ction	stic fines, moist, no HCI  t, medium ny, flaky  loose, fine 2" lens of			Driller's Remark: Hard at 64.0'  Switch to 2-7/8" tricone bit at 65.0'
70	70.0							-		- 
-26.6 - - -	71.5	1.5	SS-15	22-16-19 (35)	70.0-71.5' - yellov to coarse grained	Limestone Fragments (Swish gray, (5Y 7/2), wet, od, 25% low plastic fines, 4 stone fragments, strong	dense, fine 40-45% fine			- - -
	75.0 75.0	0.0	<b>∖</b> SS-16 <i>)</i>	50/0 (50/0")	No Recovery At few limestone fra					
								1		
				l						



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724860.4 N, 455975.6 E (NAD83)

ELEVATION: 43.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER LEVELS: 9.5 ft bgs on 12/3/07							
				STANDARD	SOIL DESCRIPTION	g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME LICCO COCUP CVAROU COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE ACE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	BOLI	DRILLING FLUID LOSS, TESTS, AND
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYM	INSTRUMENTATION
-36.6	80.0	1.1	SS-17	4-46-50/1	Sandy Silt And Limestone Fragments (ML) 80.0-81.1' - grayish yellow, (5Y 8/4), wet, fine to		_
-	81.1			(96/7")	coarse grained, rapid dilatancy, strong to very strong HCI reaction, 20-25% fine to coarse carbonate sand,		Switch to rock coring at 81.0'
-					\ 45-55% limestone fragments to 1" subangular, strong / -	ł	-
-					\to very strong HCl reaction Begin Rock Coring at 81.0 ft bgs See the next sheet for the rock core log		-
-					See the next sheet for the rock core log	l	-
_					_		
_					-		-
85 <u> </u>							-
-					-	1	-
-					-	1	1
_					_		
-					-		-
-					-		-
-					-		-
-					-		1
90							
-46.6 _					-		-
-					-		-
-					<del>-</del>		-
-					<del>-</del>		1
_					_		
-					-		-
-					-		-
95					-	1	-
-51.6						1	
-							
_					-		_
-					-		-
-					-	1	1
-					-	1	1
_					-		_
100						$\vdash$	



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724860.4 N, 455975.6 E (NAD83)

ELEVATION: 43.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS: 9.5	ft bgs	s on 12	2/3/07 START : 12/2/2007 END : 12	/3/20	D7 LOGGER : T. Borton, J. Schaeffe	r
≥∩≘	. (9			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	TH.	D (%)	TUR 100-	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	3OLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ENGE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
пош	81.0	α.	ΨΔ		S	Limestone	Begin rock coring at 81.0'
-	51.0		3	81.1' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight	Ħ	<ul> <li>81.0-84.3' - yellowish gray, (5Y 7/2),</li> </ul>	Degiti fock config at 61.0
_				81.4' - Fracture, 15 deg, rough, undulating,	L	fine to coarse grained, strong HCl reaction, very weak (R1), voids to 1"	-
_			>10	tight 81.6' - Mechanical break or bedding plane,	⊬	<ul><li>(predominately &lt;1/16") approximately</li></ul>	-
_	D4 NO			<5 deg, smooth, planar, open <1/16"	口	20% of core, fossiliferous (casts and molds)	-
_	R1-NQ 5 ft	17	>10	82.5' - Mechanical break, <5 deg, rough, undulating, tight	ш	- Holds)	-
_	66%		1	82.5-82.7 - Fracture zone, <5 deg, fragments	├	_	
_			_1_	to 2", angular 83.4' - Bedding plane, <5 deg, rough,	F	- No Recovery 84.3-86.0'	_
85			ND	undulating, open <1/16"	片	_	
-41. <del>6</del>			NR	83.6-84.0 - Fracture zone, horizontal, fragments from <1/8" to 2" angular to	⊬	_	R1: 11 minutes
	86.0			subangular	尸	<u></u>	Core run times not
			>10	84.15' - Fracture, 70-80 deg, rough, undulating, tight	П	<b>Limestone</b> - 86.0-91.0' - yellowish gray, (5Y 7/2),	recorded below run R1
				86.0-86.1 - Fracture zone, no visible	口	very fine to medium grained, strong	_
			2	orientation fragments to 1/2" 86.6' - Mechanical break, <5 deg, rough, -	┝	HCl reaction, weak (R2), zone from  88.3-89.6' medium stong to strong	
			_	undulating, tight	F	rock (R3/R4)	
	R2-NQ 5 ft	78	1	87.4' - Bedding plane, <5 deg, smooth, planar, open 1/2", fine infilling -	H	_	
	100%	70	'	87.8' - Bedding plane, <5 deg, rough, planar,		_	
			0	tight 88.0' - Bedding plane, <5 deg, rough, planar,    -			
90			U	open, <1/16"	Ш		
-46.6			3	90.0' - Fracture, <5 deg, rough, undulating, open, <1/16", fine infill -		_	
	91.0			90.6. 90.8' - Fractures (2), 5-10 deg, rough.	Н		
			5	undulating, open, <1/16" 91.15, 91.25' - Fractures (2), <5 deg, rough, -	F	91.0-92.35' - grayish yellow, (5Y 8/4), fine to coarse grained, strong HCl	
				undulating, open to 1/4"	Ë	reaction, very weak to weak (R1 to	<u> </u>
			3	91.5' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight	<b>—</b>	R2), voids to <1/6", 5-15% of core  Sandy Fat Clay (CH)	_
				91.8, 91.95, 92.1, 92.15' - Mechanical break	尸	_ \ 92.35-92.5' - light olive gray, (5Y	_
	R3-NQ 5 ft	35	1	or bedding plane (4), <5 deg, rough, undulating, open to 1/4"	$\vdash$	\( 5/2 \), moist, high plasticity, no \( \)	]
	92%	00	'	92.35-92.5' - Fracture or bedding plane, <5	口	_ Limestone	
			>10	deg, smooth, planar, fine infilling 93.75, 94.1' - Mechanical break (2), <5 deg, -	$\vdash$	92.5-93.5' - Same as 91.0-92.35'	
95			- 10	rough, undulating, tight	H	93.5-95.6' - Same as 91.0-92.35' — except medium to coarse grained,	
-51.6			>10	94.5-95.6' - Fracture zone, no visible orientation, fragments to 2" angular, dark -	广	voids to <1/16" approximately	
	96.0		NR	gray to black staining on some fragments	片	15-25% of core No Recovery 95.6-96.0'	
			1	96.15' - Bedding plane, <5 deg, rough,	dash	Limestone	
]				undulating, open <1/16" 96.6-97.7' - Mechanical break, vertical,	$\vdash$	96.0-101.0' - yellowish gray to grayish yellow, (5Y 7/2 to 5Y 8/4),	1
]			2	rough, undulating, tight	厂	fine to coarse grained, strong HCl	1
				97.77' - Bedding plane, <5 deg, rough,		reaction, very weak to medium strong (R1 to R3), fining with depth,	]
]	R4-NQ	22	_	undulating, tight	$\vdash$	voids to <1/16" 5-10% of core	1
]	5 ft 100%	33	2	98.5' - Fracture, 45-55 deg, rough,	Ė		1
]			2	undulating, tight 98.8' - Fracture, 45-55 deg, rough,	片		1
100				undulating, open 1/8"	dash		1
-56.6			_	99.6' - Mechanical break or bedding plane, — <5 deg, rough, undulating, open 1/8"	$\vdash$		
	101.0		2		Ш		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	CT-01	SHEET	7	OF	7

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724860.4 N, 455975.6 E (NAD83)

ELEVATION: 43.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS: 9.5	ft bg	s on 12	2/3/07 START : 12/2/2007 END : 12	2/3/200	07 LOGGER : T. Borton, J. Schaeffe	r
<b>₹</b> □₽	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
ELO T ANI	JN, AND RY (9		ZES T	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_			0	_	H	Limestone - 101.0-106.0' - yellowish gray, (5Y	_
-	-			102.0' - Mechanical break, <5 deg, rough,	Н	7/2), very fine to medium grained, strong HCl reaction, weak to medium	=
-			1	undulating, tight	Н	strong (R2 to R3), voids to 1/8" (predominately <1/16") over	-
-	R5-NQ			-	Ш	approximately 15% of core, trace	-
-	5 ft 100%	100	0	-	Н	– organics	-
			0		Ш		_
105_ -61.6				_	H	_	
-01.0			0	-	H	_	=
-	106.0			-	Ħ	106.0-111.0' - Same as 101.0-106.0'	Water level = 9.5' below
-			1	106.3, 107.35, 107.6' - Mechanical break (3), - <5 deg, rough, undulating, open 1/8"	Ħ	<ul> <li>except weak (R2), irregular wavy bedding from 106.5-107.45',</li> </ul>	ground surface -
			2		Ħ	fossiliferous zone from 105.5-107.45, with voids to 1/8" over 10-12% of the	
_	Balla				Ħ	core	_
-	R6-NQ 5 ft	57	1	108.45' - Fracture, 5-10 deg, rough,	H	_	=
-	100%			undulating, tight		_	=
110			1	rough, undulating, tight		-	=
-66.6			1		Ы		
-	111.0		· ·		Н	Bottom of Boring at 111.0 ft bgs on	Total depth of boring is 711.0'
-				-	1	- 12/3/2007	_
-				-	1	-	-
-				-	1	-	-
					]	_	
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-02	SHEET	1	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724719.3 N, 456342.2 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 3-7/8" drag bit

DRILLIN	G METH	OD AND	EQUIPM	ENT : CME 550 S	/N 186073, mud rotary, cathead, AWJ rods, 3-7/8" drag bit		ORIENTATION : Vertical
WATER	LEVELS	: 6.1 ft bo	gs on 11/3	30/07	TART : 11/29/2007 END : 12/1/2007 LOGGER	R : D	Whitaker
]				STANDARD	SOIL DESCRIPTION	g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLIC LOG	
BH		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	13	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH RFA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	MBC	INSTRUMENTATION
SU				(N)		SΥ	
42.3	0.0				Topsoil 0.0-0.15' - Poorly graded sand with organics	111	
		1.2	SS-1	2-3-3 (6)	Poorly Graded Sand With Silt (SP-SM)	Hi	
	1.5			(0)	$\neg$ 0.15-1.15' - pale yellowish brown grading to dark		1
-					yellowish brown, (10YR 6/2 to 10YR 4/2), moist, loose, fine grained, no HCl reaction, silica sand, trace	1	1
-					to 10% nonplastic fines	1	1
-					-	1	-
-					<del>-</del>	1	-
-					-	1	-
-					-	┨	-
					-	+	-
5 37.3	5.0				Clayey Sand (SC)	177	_
-				4-3-32	5.0-5.75' - moderate yellowish brown to light greenish -	<i>\\\\\</i>	-
-		1.3	SS-2	(35)	gray, (10YR 5/4 to 5G 8/1), moist, dense, fine grained, slow dilatancy, no HCl reaction, 30% medium to high	<b>-</b>	Drillor's Romark: Hard drilling at 6.01
-	6.5				\sigma dilatancy, no HCI reaction, 30% medium to high \\ \[ \] \square  \  \] \  \  \  \  \  \  \  \  \  \  \  \  \	#"	Driller's Remark: Hard drilling at 6.0'
_					Silt (ML)	1	_
_					5.75-6.3' - grayish orange to moderate yellowish brown, (10YR 7/4 to 10YR 5/4), moist, hard,	1	_
					nonplastic, very rapid dilatancy, mild to moderate HCI		
					reaction, 5-10% very fine sand, carbonate materials,		
					trace organics		
					-	1	_
10	10.0				-	1	_
32.3				0 4 50/0 5	Silt With Limestone Fragments (ML)	III	Driller's Remark: Lost 50% circulation at
-		0.9	SS-3	3-4-50/3.5 (54/9.5")	10.0-10.85' - grayish orange to dark yellowish orange, - (10YR 7/4 to 10YR 6/6), wet, hard, nonplastic, high	Ш	10.0'
-	11.3			(0 010 )	dilatancy, mild to moderate HCl reaction, 10% very	1	1
-					fine sand, 50% limestone lenses (angular limestone fragments up to 1" diameter), trace black organic	1	1
-					staining	1	Driller's Remark: Hard drilling at 12.0'
-					-	1	
-					-	┨	-
-					-	┨	-
-					-	┨	Driller's Remark: Losing circulation, soft,
-					-	-	possible void space at 14-14.5'
15 <u> </u>	15.0	0.0	00.4	50/4.5	_ Silty Sand With Limestone Fragments (SM)	1	Drillor's Romark: Hard drilling 1009/
	15.4	0.3	SS-4	(50/4.5")	\ 15.0-15.3' - Same as 10.0-10.85' except 34%		Driller's Remark: Hard drilling, 100% circulation loss at 15.0'
-					nonplastic fines, 66% limestone fragments, no	4	_
					organics	1	_
					_	1	
					_	1	Driller's Remark: Regaining some circulation at 17.5'
					_		Driller's Remark: Soft at 17.9-18.5', lost all
							circulation Driller's Remark: Light drill chatter at 18.0'
]	20.0					1	Driller's Remark: Hard drilling at 19.0'
	20.1	0.0	SS-5	50/1.5 (50/1.5")	No Recovery 20.0-20.1'		1
20				(50/1.5")	-	1	1
					Begin Rock Coring at 20.0 ft bgs	1	
					See the next sheet for the rock core log		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

CT-02

SHEET 2 OF 4

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724719.3 N, 456342.2 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS: 6.1	ft bg	s on 1	1/30/07 START : 11/29/2007 END : 12	2/1/20	07 LOGGER : D. Whitaker	
≥o⊋	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
FH B	E RL STH, OVEI	(%) Q	FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR!	SOR	RO	-RA(	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
22.3	20.0	_	1	20.1' - Fracture, horizontal, rough, undulating,	Ü	Limestone	Water level is 6.1' below
-	R1-NQ 1.5 ft	50	2	bedding plane fracture, half of fracture	╁	- 20.0-21.1' - grayish orange to dark	ground surface on -
-	73%	00	NR	surface open, <1/16" silt infill 20.85' - Fracture, 10 deg, smooth to rough,	F	yellowish orange, (10YR 7/4 to 10YR 6/6), fine grained, mild HCl reaction,	11/30/07 at 07:50 Begin rock coring at 20'
-	21.5		INK	undulating, open, <1/16" fine sand and silt	世	<ul> <li>weak (R2), voids to 1/16" diameter</li> </ul>	R1: 8 minutes -
-			>10	infill 20.91' - Fracture, 65 deg, rough, undulating,	╁	over 30% of rock, 5-10% cavities up to 1/4" diameter, poorly fossiliferous,	08:50-10:15 Changing out _ damaged drill bit
-				trace of fine sand infill, open	$\blacksquare$	<ul> <li>trace recrystallization in pore space</li> </ul>	
-			4	21.65' - Fracture, 75 deg, rough, undulating,		No Recovery 21.1-21.5' Limestone	Driller's Remark: Soft
-	R2-NQ			open 22.1-23.0' - Fracture zone, horizontal,	+	<ul><li>21.5-24.75' - dark yellowish orange,</li></ul>	drilling at 23.0', hard at -
-	5 ft	45	1	angular limestone fragments with trace of silt infill	H	(10YR 6/6), fine grained, moderate HCl reaction, weak (R2), voids to	24.0'
-	65%		0	22.6' - Fracture, 5 deg, rough, undulating,	Ė	1/16" diameter over 40% of core	-
25 <u> </u>				tight	世	surface, 5-10% spherical and elongated cavities up to 1/4"	_
			NR	open to tight (other surface in fragments but	₩	<ul> <li>diameter, highly fossiliferous</li> </ul>	R2: 23 minutes
-			\	fits tight on surface) 22.85' - Fracture, 20 deg, rough, undulating	ш	(molds/casts) No Recovery 24.75-26.5'	TV2. 23 minutes
-	26.5			to stepped, open	仜	Limestone	-
-			>10	23.5' - Fracture, 20 deg, rough, undulating, tight	士	_ 26.5-27.15' - dark yellowish orange _	Driller's Remark: Soft
-	1			24.15' - Fracture, 70 deg, rough, undulating,	4	to moderate yellowish brown, (10YR 6/6 to 10YR 5/4), fine to medium	drilling at 27-28'
-			>10	1/4" open	₩	grained, mild HĆl reaction, extremely	-
_			- 10	26.75' - Fracture, 10 deg, rough, undulating, open	F	weak (R0), voids to 1/16" cover 40% of core surface, 5-10% cavities up to	-
_	R3-NQ 5 ft	0	>10	26.9-27.15' - Fracture zone, subangular	Ľ	1/4" diameter, possible bioturbation	-
-	48%			limestone rock fragments up to 1-1/2" diameter	H	at 26.9'; trace silt infill, trace	_
30 <u> </u>				27.9-28.4' - Fracture zone, fragments from	$oldsymbol{\perp}$	recrystallization in void space, poorly fossiliferous	
12.3			NR	coarse sand size to 3/4" diameter, subangular to angular	ш	Silt (ML)	
_				28.5' - Fracture, vertical, rough, undulating, tight	仜	27.15-27.9' - grayish orange, (10YR 7/4), wet, soft, nonplastic, very rapid	R3: 8 minutes
_	31.5			28.6-28.7' - Fracture zone, rock fragments	$\vdash$	dilatancy, moderate HCl reaction,	_
_			1	28.8' - Fracture, 85 deg, rough, undulating 31.9' - Fracture, 20 deg, smooth to rough,	$\vdash$	with 10% fine to coarse sand-sized limestone fragments	
_				undulating, open	F	Limestone	Driller's Remark: Soft at 32.0-32.5', hard at 32.5'
-			1	32.9' - Fracture, 20 deg, rough, undulating,	片	27.9-28.75' - Same as 26.5-27.15' - 28.75-28.9' - pale yellowish brown to	-
_				1/2" open	$\vdash$	dark yellowish orange, (10YR 6/2 to	_
-	R4-NQ 5 ft	82	3	33.7, 34.0' - Fractures (2), 20 deg, rough,	$\vdash$	10YR 6/6), very fine to fine grained, strong HCl reaction, weak (R2),	-
-	91%			undulating to stepped, open up to 1/2", <1/16" sand infill	厂	voids (1/16") over 1% of core	-
35			1	34.45' - Fracture, 10 deg, smooth, planar,	上	surface, poorly fossiliferous  No Recovery 28.9-31.5'	_
7.3				tight .	$\vdash$	Limestone	
_			1	35.6' - Fracture, horizontal, rough, undulating, open up to 1"	广	31.5-32.15' - yellowish gray to - moderate yellow, (5Y 7/2 to 5Y 7/6),	R4: 21 minutes
_	36.5		NR	36.0' - Fracture, 70 deg, rough, undulating,	片	very fine to fine grained, mild HCI	
-			>10	open (missing half of fracture surface) 36.65-36.85' - Fracture zone, subangular to	H	reaction, very weak (R1), small voids (1/16") over 2% of core surface, 2	Driller's Remark: Soft drilling from 36.5-38', hard -
_				subrounded rock fragments with rough to	$oxed{\bot}$	possible cavities up to 3/4" diameter,	at 38.0', soft at 38-38.5',
_			>10	smooth and undulating surfaces	口	very poorly fossiliferous, black staining covers 40% of surface, also	hard at 38.5'
_	]			37.3' - Fracture, 20 deg, rough, undulating, up to 1/4" open	$\vdash$	trace iron staining orange-red yellow	_
_	R5-NQ 5 ft	16	0	37.35, 37.5, 37.7' - Fractures (3), 25 deg,	$\vdash$	color	_
	42%	10	NR	rough, undulating, open up to 1/2", trace sand infill	F	_	
40				37.85' - Fracture zone, rock fragments			



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338884.FL

BORING NUMBER:

CT-02

SHEET 3 OF 4

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724719.3 N, 456342.2 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS: 6.1	ft bg	s on 1	1/30/07 START : 11/29/2007 END : 12	/1/200	D7 LOGGER : D. Whitaker	
≥O≎	(%			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
ELO N (F	AND AND AND	_	ZES T	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B FACE	E RL STH, OVEI	RQD(%)	FOOF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	S O	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
2.3				38.0' - Fracture, 20 deg, rough, undulating,	Ш	Limestone	
_			NR	up to 1/2" open - 38.15' - Fracture, 20 deg, rough, undulating	Ш	<ul> <li>32.15-36.05' - light olive gray, (5Y 2/2), fine to medium grained,</li> </ul>	R5: 7 minutes
	41.5			38.2' - Fracture, 10 deg, rough, undulating	Ш	moderate HCl reaction, weak (R2), voids 1/16" diameter cover 10% of	
_			2	_		core surface, 5-10% cavities up to 1"	
_			_	42.25' - Fracture, 20 deg, rough, undulating,		diameter, highly fossiliferous (molds/casts)	
_			>10	tight 42.35' - Fracture, horizontal, rough,		No Recovery 36.05-36.5' Limestone	
_	R6-NQ			undulating, up to 1" open		<ul> <li>36.5-38.6' - moderate olive brown,</li> </ul>	
-	5 ft	25		42.9' - Fracture, 20 deg, rough, undulating, trace sand infill	H	(5Y 4/4), fine to medium grained, mild HCl reaction, extremely weak	
-	40%			43.15-43.5' - Fracture zone, fine to coarse gravel-sized subangular to subrounded rock	H	<ul> <li>(R0), voids up to 1/16" diameter over 50% of core surface, 10% cavities up</li> </ul>	
45 -2.7			NR	fragments —		to 1/4", moderately fossiliferous	_
-				-	Ш	<ul> <li>(fossils), trace molds and casts, 5% silt infill in void space, 5%</li> </ul>	R6: 7 minutes
-	46.5			-	Ш	recrystallization, trace black material	
_	70.5			-	Ш	(possible fossils or organics) No Recovery 38.6-41.5'	
_			2	46.8' - Fracture, horizontal, rough, undulating, - tight to 1/4" open, trace black staining on	Ш	Limestone 41.5-43.5' - Same as 36.5-38.6'	•
_			4	surfaces 47.5, 47.65' - Fracture (2), horizontal, rough,		No Recovery 43.5-46.5'	_
			4	undulating, tight to 1/4" open, black organic		Limestone 46.5-47.65' - moderate yellowish	
_	R7-NQ 5 ft	40	>10	staining covers 5% fracture surfaces 47.95' - Fracture, 40 deg, rough, undulating -	Ш	brown, (10YR 5/4), fine grained, mild HCl reaction, weak (R2), voids	
_	92%			to stepped, eroding fracture surface 47.95-48.7' - Fracture zone, horizontal, many	Щ	(1/16") over up to 30% of core	
50 -7.7			>10	bedding plane fractures, fissile/easily broken		surface, 10% cavities up to 1/2" size, highly fossiliferous (molds)	_
-7.7				material 48.7' - Fracture, 70 deg, smooth to rough,	Ш	Silty Sand (SP)	R7: 11 minutes
_			1	undulating, eroding fracture surface - 48.7-49.25' - Fracture zone, sand to coarse	Ш	47.65-48.0' - moderate yellowish brown, (10YR 5/4), wet, fine to	TV. 11 minutes
=	51.5		NR	gravel-sized rock fragments		_ coarse grained, medium plasticity Limestone	Driller's Remark: Hard
-			>10	49.15' - Fracture, vertical, rough, stepped, ppen		48.0-49.1' - moderate yellowish	drilling at 52'
-				49.8' - Fracture, 80 deg, rough, stepped,		<ul> <li>brown, (10YR 5/4), fine grained, mild HCl reaction, extremely weak (R0),</li> </ul>	
_	1		0	open 49.8-50.2' - Fracture zone, silt to fine	H	voids (1/16") over 5% of core	
_	R8-NQ	20		gravel-sized rock fragments = 50.2' - Fracture, 80 deg, rough, stepped, =	H	<ul> <li>surface, mostly poorly competent with silt infill</li> </ul>	
	5 ft 62%	38	3	open 50.6' - Fracture, 10 deg, rough, stepped, tight	H	49.1-51.1' - moderate yellowish brown, (10YR 5/4), fine grained, mild	
55			_0_/	to 1/4"open, <1/16" silt infill	Ħ	HCl reaction, very weak (R1), small (1/16") voids over 2% of core	_
-12.7			NR	51.5-52.2' - Fracture zone, rock fragments from fine to coarse gravel-sized, subangular -	H	surface, many cavities up to 3/4",	D0: 40 minute
_				to subrounded 52.2' - Fracture, 0-10 deg, rough, undulating,	H	moderately fossiliferous (molds)  No Recovery 51.1-51.5'	R8: 16 minutes
_	56.5			open -	H	Limestone 51.5-52.2' - pale yellowish brown to	
_			0	53.7' - Fracture, horizontal, smooth to rough, planar, tight	Ш	moderate yellowish brown, (10YR 6/2	
-				54.05' - Fracture, 10 deg, rough, undulating, -	Ш	to 10YR 5/4), fine grained, mild HCl reaction, extremely weak to very	
-			1	tight 54.25' - Fracture, horizontal, rough,	Н	weak (R0 to R1), voids (1/16") over	
_	R9-NQ			undulating, fossil prints in black staining on - fracture surface	H	5% of core surface, cavities up to 3/4"x1/2", fossiliferous, trace molds,	
-	5 ft 98%	70	3	58.4' - Fracture, horizontal, rough, undulating,	Ш	trace organic staining (2% coverage)	
60	1 33,3			open, 1" sand and silt infill, black staining on - 1% of fracture surface	Ш	_	-
	1		1				1



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724719.3 N, 456342.2 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, NQ tools, NW casing

NATER	LEVELS: 6.1	ft bg	s on 1	1/30/07 START: 11/29/2007 END: 1	2/1/20	007	LOGGER : D. Whitaker	
≥⊖£	(%			DISCONTINUITIES	၅		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-17.7	61.5 R10-NQ 5 ft 100%		1 1 1 1 1	58.9' - Fracture, horizontal, rough, undulating, tight to 1/4" open 59.15' - Fracture or mechanical break, rough, undulating, fissile surfaces, tight 59.25' - Fracture or mechanical break, rough, stepped, tight 59.8' - Fracture, horizontal, rough, undulating, 1/4" open 59.8' - Fracture, horizontal, rough, undulating, 1" of silt and sand infill between the two fracture surfaces 60.2' - Fracture, horizontal, rough, stepped, tight 62.1' - Fracture, 10 deg, smooth, undulating, tight to 1/4" open 63.05' - Fracture or mechanical break, horizontal, smooth, undulating, tight 64.0' - Mechanical break 64.35' - Fracture, 45 deg, rough, undulating, tight, black fossils 2% coverage 65.35' - Fracture, 0-20 deg, rough, undulating, tight 65.9' - Fracture, horizontal, rough, undulating, tight 65.9' - Fracture, horizontal, rough, undulating, tight, coral mold on fracture surface		Li 52 m to H to gree (1 posts s m to H to post m to h to post m to h to post m to h to post m to h to post m to h to post m to h to post m to h to post m to h to post m to h to post m to h to post m to h to post m to	mestone 2.2-53.7' - pale yellowish brown to oderate yellowish brown, (10YR 6/2 .10YR 5/4), very fine to fine rained, moderate to strong HCl raction, weak (R2), small voids /16") cover 5% of core surface, borly fossiliferous, 2% black aining, 5% recrystallization 3.7-54.2' - pale yellowish brown to oderate yellowish brown, (10YR 6/2 .10YR 5/4), fine grained, strong Cl reaction, extremely weak (R0), borly fossiliferous 4.2-54.6' - pale yellowish brown to oderate yellowish brown, (10YR 6/2 .10YR 5/4), fine grained, strong Cl reaction, very weak (R1), voids /16") cover 10% of core surface, avities up to 1/2" diameter, oderately fossiliferous with black ssils, 2% black staining of Recovery 54.6-56.5' mestone 5.5-59.15' - pale yellowish brown to oderate yellowish brown, (10YR 6/2 .10YR 5/4), fine grained, strong Cl reaction, very weak (R1), voids /16") cover 40% of core surface, ery fossiliferous, with cavities up to 4" diameter, black fossils and fossil olds, trace fossil casts, silt with and-sized limestone fragments at 3.4-58.5' and 57.8-57.9' 9.15-59.9' - pale yellowish brown to oderate yellowish brown, (10YR 6/2 .10YR 5/4), fine grained, strong Cl reaction, extremely weak (R0), ovoids, trace cavities, moderately siliferous with black fossils 9.9-60.4' - pale yellowish brown to oderate yellowish brown, (10YR 6/2 .10YR 5/4), fine to very fine rained, strong HCl reaction, weak (R2), voids (1/16") cover 15% of core urface, cavities up to 3/4"x1/2", oderately fossiliferous (molds), ore large cavities up to 3/4"x1/2", oderately fossiliferous (molds), ore large cavities (up to 1"x1-1/2"), creept more fossiliferous (molds), ore large cavities (up to 1"x1-1/2"), creept more fossiliferous (molds), ore large cavities (up to 1"x1-1/2"), creept more fossiliferous (molds), ore large cavities (up to 1"x1-1/2"), creasing with depth of the process of the process of the process of the process of the process of the process of the process of the process of the process of the process of the process of the process of the process of t	Driller's Remark: Hard drilling at 59.5' R9: 11 minutes



PROJECT NUMBER:	BORING NUMBER:	
338884.FL	CT-03	SHEET 1 OF 4

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724626.2 N, 456581.9 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit

WATER	LEVELS	: 3.0 ft bo	gs on 12/0	03/07	START : 12/2/2007 END : 12/5/2007 LOG	GER	: D.	Whitaker, T. Borton
				STANDARD	SOIL DESCRIPTION		3	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	RECOVE	ERY (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
SUR!			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTATION
40.8	0.0	1.2	SS-1	1-2-2 (4)	Topsoil 0.0-0.4' - brownish black, (5YR 2/1), organics Poorly Graded Sand (SP) 0.4-1.15' - yellowish gray, (5Y 7/2), moist, very loose, very fine to fine grained, no HCI reaction, silica sand,		<u> </u>	- - -
- - - -					5% organics, trace nonplastic fines			- - - - -
5 35.8	5.0				No Recovery 5.0-6.5'			<del>-</del>
-	6.5	0.0	SS-2	3-2-3 (5)		-		- - -
-	8.0	0.4	SS-3	NA (NA")	Fat Clay With Sand (CH)  6.5-6.9' - light olive gray, (5Y 6/1), wet, very soft, high plasticity, slow dilatancy, no HCl reaction, 15% fine silica sand			Driller's Remark: Medium chatter at 6.5'  Due to no recovery at previous interval, another sample was collected at 6.5-8.0'  SPT results not recorded
- - 10 30.8	10.0			50/5.5	¬, Silt (ML)	-		- - Driller's Remark: Moderate chatter and hard
-	10.5	0.2	SS-4	(50/5.5")	10.0-10.2' - moderate yellow to dusky yellow, (5Y 7/6 to 5Y 6/4), mild to moderate HCl reaction, 70% nonplastic fines			at 10.0'
-						-		Driller's Remark: Light chatter at 13.5-15.0'
15 25.8	15.0				Sandy Silt And Limestone Fragments (ML)		П	_
-	16.5	1.2	SS-5	27-13-14 (27)	15.0-16.15' - pale yellowish orange to dark yellowish orange, (10YR 8/6 to 10YR 6/6), wet, very stiff, high dilatancy, moderate HCl reaction, 15-20% fine to	7		- -
-					coarse grained sand and gravel size limestone fragments	_/		- - -
-						1		- - -
						-		Driller's Remark: 19.5-20.0' soft
20								



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-03	SHEET	2	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724626.2 N, 456581.9 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit

WATER	LEVELS	: 3.0 ft bo	as on 12/0	03/07	START : 12/2/2007 END : 12/5/2007	LOGGER	: D.	Whitaker, T. Borton
300				STANDARD	SOIL DESCRIPTION		G	COMMENTS
AND N (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COL	OR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE ATIC		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSIT	Y OR	BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERA	ALOGY	SYM	INSTRUMENTATION
20.8	20.0	0.7	SS-6	3-50/3.5	Silty Sand And Limestone Fragments (SM)	daa	Ш	
	20.8	0.7		(53/9.5")	20.0-20.7' - dusky yellow, (5Y 6/4), wet, very on the to coarse grained, mild to moderate HCI is	reaction, /	111	Driller's Remark: Very hard at 20.5'
l -					30% nonplastic fines; 40% fine gravel-sized li	imestone / _		_
_					(inaginionio, carbonato cana			
_						-		Driller's Remark: Heavy chatter at 22.0'
-						_		Driller's Remark: 22.0-23.0' 100% loss of circulation
-						-		Driller's Remark: Regain circulation after
-						-		mixing more mud at 23.5'
25	25.0					-		-
15.8	25.0			9-30-50/1.5	Silty Gravels (GM)		$\cdot \mid \uparrow \mid$	
-	26.1	0.7	SS-7	(80/7.5")	25.0-25.7' - dark yellowish orange, (10YR 6/6) very dense, fine to coarse grained, moderate	), wet,	<b>       </b>	Driller's Remark: Dropped 3 inches from
-	26.1				reaction, carbonate sand, 24% nonplastic fine gravel-sized limestone fragments	es, 20%	l	25.5-25.75' (soft or possible void)
					graver-sized irriestorie tragments			
_						_		
_						_		_
_						-		-
-						-		-
-						-		-
30 <u> </u>	30.0			29-50/3.5	Limestone With Silty Sand		Н	<del></del>
-	30.8	0.6	SS-8	(79/9.5")	30.0-30.6' - dusky yellow, (5Y 6/4), wet, very of mild to moderate HCl reaction, gravel sized g	dense, –		-
-					30% silty sand (SM) similar to 25.0-25.7'	-		-
-						_	ı	Driller's Remark: Heavy Chatter at 31.5'
_						_	1	_
						_		Driller's Remark: Heavy chatter at 32.5'
l -						_		Driller's Remark: Soft at 33.0-34.5'
-						-		_
-	05.0					_		Driller's Remark: Heavy chatter at 34.5'
35 5.8	35.0	0.5	SS-9	40-50/0.75	Limestone With Silty Sand			Driller's Remark: Loss of circulation at 35.0' —
5.5 -	35.6	0.5	33-9	(90/6.75")	35.0-35.5' - Same as 30.0-30.6 Begin Rock Coring at 35.5 ft bgs			Water level is 3.0' below ground surface at \ 07:53 on 12/3/07
-					See the next sheet for the rock core log	-		)
-					_	-		-
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_						_		
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PROJECT NUMBER:

33884.FL

BORING NUMBER:

CT-03

SHEET 3 OF 4

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724626.2 N, 456581.9 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

WATER	LEVELS: 3.0	ft bgs	on 12	2/03/07 START : 12/2/2007 END :	12/5/20	07 LOGGER : D. Whitaker, T. Borto	n .			
≥∩≘	_ (6			DISCONTINUITIES	ပွ	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,			
H B ATIC	E RU STH, OVEF	(%) O	150 100 100 100 100 100 100 100 100 100	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD			
E-SEP	SECC	ROI	'RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	S   S	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.			
	35.5		>10	35.5-35.85' - Fracture zone, fine to coarse	+ "	Limestone	Begin rock coring at 35.5'			
-	R1-NQ 1.5 ft	50		angular gravel sized fragments	+	- 35.5-36.7' - dusky yellow to light olive	R1: 8 minutes			
-	80%	50	1	35.85' - Fracture, 60 deg, rough, undulating, open	+	gray, (5Y 6/4 to 5Y 5/2), very fine to fine grained, mild HCl reaction, weak	-			
-	37.0		NR	36.6' - Fracture, 70 deg, rough, undulating,	$\pm$	<ul><li>(R2), voids 1/16" diameter over 1%</li></ul>	-			
-			3	open 1/16"-1/8", organic infilling 37.0-37.15' - Fracture zone, angular fine	+	core surface, 2 cavities up to 1/2"x1- 1/2" possibly both fossil molds, black	-			
-	-			gravel sized fragments	+	<ul> <li>staining over 15% core surface</li> </ul>	-			
-			0	37.65' - Fracture, horizontal, smooth, undulating, 1/4" open	$\pm$	No Recovery 36.7-37.0' Limestone	-			
-	R2-NQ			37.75' - Fractures (3), 40-50 deg, smooth,	+	- 37.0-41.0' - light olive gray to dusky	-			
-	5 ft	78	1	undulating, 2 open, 1 tight 39.1' - Fracture, horizontal, rough, planar,	+	yellow, (5Y 2/2 to 5Y 6/4), very fine to fine grained, mild to moderate HCl	-			
40 0.8	96%			open up to 1/4"	+=	reaction, weak (R2), voids 1/16"	_			
-			1	39.5, 40.25' - Mechanical break (2)	H	diameter over 2% core surface from 37.0-38.5' to over 5% from 38.5-40.0'	-			
-				40.6' - Fractures, horizontal, rough, stepped, tight	++	and 10% from 40.0-41.0', grain size	R2: 18 minutes			
-			2	41.35, 41.7' - Fractures (2), horizontal, rough,	$\perp$	coarsening with depth, number and size of cavities increasing with depth,	- TV2. 10 Hilliates			
-	42.0		NR	undulating, fissile up to 1/2" open	$\pm$	up to 1"x1- 1/2", highly fossiliferous -	-			
-			3	42.1' - Fracture, 15 deg, rough, undulating, tight, fissile	$\pm$	molds/casts, trace possible black fossils	-			
-	-			42.7, 42.8' - Fractures (2), horizontal, rough,	+	41.0-41.8' - dusky yellow, (5Y 6/4), fine to medium grained, mild HCl	-			
-			>10	undulating, open up to 1/2", fissile 43.0, 43.3' - Fractures (2), 0-10 deg, rough,	+	reaction, extremely weak (R0), voids	-			
-	R3-NQ		1	undulating, open up to 1/2" 43.4-43.55' - Fracture zone, coarse sand to	#	_ 1/16" over 30% of core surface, cavities up to 3/4"x1-1/2", highly	-			
	5 ft	11	$\Box$	fine gravel size subrounded fragments	£	fossiliferous with molds and casts,	-			
45 -4.2	45%			43.8, 44.0, 44.3' - Fractures (3), horizontal, rough, undulating, tight to 1/2" open	₩	1% organics No Recovery 41.8-42.0'	_			
-				NR	NR	NR		+	Limestone	-
-					士	42.0-44.25' - Same as 41.0-41.8' except moderate yellowish brown,	R3: 3 minutes			
-					士	(10YR 5/4), number of cavities	-			
-	47.0			47.451 Frankins besites the large	$\pm$	increasing with depth No Recovery 44.25-47.0'	-			
-			2	47.15' - Fracture, horizontal, rough, undulating, open	+	- Limestone	-			
1 -			0	47.41' - Fracture, horizontal, smooth to rough, undulating, open up to 1/2"	+	47.0-48.2' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), fine grained,	-			
-				rough, undulating, open up to 1/2	+	mild HCl reaction, weak (R2), voids 1/16" over 40% of core surface:	-			
-	R4-NQ				+	10-20% cavities up to 1/2" diameter,	-			
	5 ft 24%	16			+	highly fossiliferous with molds, casts and fossils, 10% recrystallization in	-			
-9.2	2470		NR		$\pm$	1/16" voids	_			
-					廿	No Recovery 48.2-52.0'	-			
-					$\perp$	<del> </del>	R4: 18 minutes			
-	50.0				+	}	-			
-	52.0			F2.15' Fracture harizantal rough planar to	#	L Limestone	Water level 3' 2" below			
1 -			5	52.15' - Fracture, horizontal, rough, planar to rough stepped, open up to 1/2", organic	#	- 52.0-52.55' - dusky yellow, (5Y 6/4), fine grained, mild HCl reaction, weak	ground surface at 07:20 on - 12/4/07			
1 -				infilling, 1/16" thick 52.4' - Fracture, horizontal, rough, stepped,	$\perp$	(R2), black organic laminations	12/ <del>4</del> /U1			
1 -			>10	tight, organic infilling, 1/16" thick	+	- 1/32"-1/2" thick cover over 40% of surface, most are 1/32" thick, poorly	-			
1 -	R5-NQ			52.6' - Fracture, horizontal, rough, undulating, open up to 1/2", silt infilling	口	fossiliferous	-			
55	5 ft 40%	0		52.8-52.9' - Fracture zone, 0-10 deg, rough,	廿	†	-			
-14.2	40 /0			undulating, open	$\pm$	<u></u>	_			



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-03	SHEET	4	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724626.2 N, 456581.9 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS : 3.0	) ft bg:	s on 12	2/03/07 START : 12/2/2007 END : 12	/5/20	07 LOGGER : D. Whitaker, T. Borton	1
<b>≥</b> ∩≎	(%)			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-	57.0		NR	53.15' - Fracture, 70 deg, rough, undulating, open - 53.15-53.5' - Fracture zone, gravel sized rock fragments		Limestone  52.55-54.0' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, extremely weak to very	R5: 7 minutes
-			>10	53.65' - Fracture, horizontal, rough, undulating, tight 57.0-57.35' - Fracture zone, coarse sand to		- weak (R0 to R1), strength decreases with depth, voids cover 5% of core surface, cavities that are 1/8"-1/4" digmetre, 5% reconstallization.	-
-			>10	coarse gravel size subangular rock fragments with black organic material on fracture surfaces 58.45-58.8' - Fracture zone, coarse sand to		<ul> <li>diameter, 5% recrystallization (white), 1% black organics, 5% linear</li> <li>2"x1/16" thick, gray material from</li> <li>52.8-53.2'</li> </ul>	-
60	R6-NQ 5 ft 50%	30	1	coarse gravel size subangular to subrounded rock fragments, fracture surface are 20 deg		No Recovery 54.0-57.0' Limestone	Driller's Remark: Soft at 57-59.6', hard at 59.5-62'
-19.2 -			NR	at 58.45' and 70 deg at 58.8', rough, — undulating to stepped 59.25' - Fracture, 15 deg, rough, undulating, tight		57.0-59.5' - moderate yellowish brown, (10YR 5/4), fine grained, mild     HCI reaction, weak to extremely     weak (R2 to R0), voids 1/16" cover 20% of core surface, cavities up to	R6: 8 minutes
-	62.0		1	- - 62.4' - Mechanical break or bedding plane,		3/4" diameter and 1-1/2"x2", highly fossiliferous with molds and casts, 1% black organic material throughout core	Original boring CT-03 abandoned at 62' due to
-			0	<5 deg, rough, undulating, tight		No Recovery 59.5-62.0' Limestone 62.0-64.5' - medium light gray to yellowish gray mottled, (N6 to 5Y)	casing problems; replacement boring located 5' north of original boring Replacement boring blind
65_	R7-NQ 5 ft 100%	88	3	- 64.55' - Bedding plane, <5 deg, smooth, undulating, tight		7/2), medium to fine grained, moderate to strong HCl reaction, medium strong (R3), voids	drilled to 62'
-24. <del>2</del> -			0	64.65' - Bedding plane, <5 deg, smooth, undulating, open to <1/16", fine infilling 64.9' - Mechanical break, <5 deg, rough,		<1/10"-1/2" <b>Silty Limestone</b> 64.5-64.65' - yellowish gray to olive gray, (5Y 7/2 to 5Y 3/2), very fine to	- R7: 19 minutes
-	67.0		1	undulating, tight 66.25' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight		<ul> <li>fine grained, mild HCl reaction, weak (R2)</li> <li>Limestone</li> </ul>	-
-			3	67.25, 67.67, 67.8' - Mechanical break (3), <5 deg, rough, undulating, tight		- 64.65-67.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), medium to coarse grained, moderate HCI	- -
-	R8-NQ	<b>57</b>	0	- 69.1' - Mechanical break or bedding plane,		reaction, very weak to weak (R1 to R2), voids <1/16" over 30-40% of core surface, trace organics, irregular bedding with depth	-
70_ -29.2	5 ft 84%	57	1	<pre>&lt;5 deg, rough, planar, open &lt;1/16"  70.0' - Fracture, 5-10 deg, rough, undulating, tight</pre>		67.0-71.2' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), medium to coarse grained, mild HCl reaction.	
-			2 NR	70.9' - Mechanical break or bedding plane, <5 deg, rough, undulating, open 1/8"		voids up to 1/2" over 5% of core surface predominately from 68.8-69.8', voids <1/16" over 45-55%	R8: 6 minutes  Total depth of boring 72.0'
-	72.0		1417	<u> </u>	<del>                                     </del>	of core surface, trace organics, moderately to highly fossiliferous (casts/molds)	Total depth of boring 72.0"
-				- -		No Recovery 71.2-72.0'  Bottom of Boring at 72.0 ft bgs on 12/5/2007	-
-				<u>-</u>		- -	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-04	SHEET	1	OF	3	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724456.6 N, 456923.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

DRILLIN	G METH	OD AND	EQUIPMI	ENT : CME 45B S	S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 4.0 ft b	gs on 11/3	30/07	START : 11/29/2007 END : 11/30/2007 LOGGER : T. Borton
1.				STANDARD	SOIL DESCRIPTION COMMENTS
SE SE SE SE	SAMPLE	INTERVA	AL (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
표시한		RECOVE	ERY (ft)	TEGT TIEGGETG	SOIL NAME, USCS GROUP SYMBOL, COLOR,
T A L			#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR ONSISTENCY, SOIL STRUCTURE, MINERALOGY SINSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (ft)			#1111	(N)	8
40.8	0.0				Topsoil (TVP 041)
-		0.8	SS-1	0-2-2	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
-	1.5			(4)	Poorly Graded Sand (SP)
-	1.5				🖠 ∥ 0.2-0.55′ - very light gray to yellowish gray, (N8 to 5Y 📗 🗍 📗
-					8/4), moist, very loose, very fine to fine grained silica sand, trace nonplastic fines, 30% organics (wood and
-					rootlets)
-					Poorly Graded Sand With Silt (SP-SM)
_					0.55-0.75' - dark yellowish orange, (10YR 6/6), moist, very loose, very fine to fine grained, silica sand, 15%
_					nonplastic fines, trace organic particles
l _					<del></del>
5	5.0				
35.8				4.6.5	Lean Clay With Sand (CL) 5.0-5.6' - greenish gray and light olive gray, (5G 6/1
		0.9	SS-2	1-2-3 (5)	and 5Y 6/1), mottled, moist, firm, low to medium
-	6.5			(0)	plasticity, slow dilatancy, 15-20% very fine to fine
-					\silica sand, trace rootlets
-					5.6-5.85' - white to yellowish gray, (N9 to 5Y 8/1), wet,
-					loose, strong HCl reaction, very fine to coarse gravel,   - 25-30% fine to coarse sand sized, 15% nonplastic
-					fines, appears to be fossiliferous
-					-
-					
-					
10 30.8	10.0				Silty Sand And Limestone (SM)  Driller's Remark: 50% water loss at 10'
30.6				14-34-50	10.0-11.3' - yellowish gray, (5Y 8/1), moist, very
-		1.3	SS-3	(84)	dense, fine to coarse grained, strong HCl reaction,
_	11.5				15-20% nonplastic fines, 40-50% fine to coarse limestone fragments, 50-60% SM, all carbonate
_					
<u> </u>					
-					1 1
-					1 1
-					<b>1</b>
15	15.0				<b>1</b>
25.8	15.0				Silt (ML)
-		1.3	SS-4	13-30-33	15.0-16.3' - grayish yellow, (5Y 8/4), moist to wet,
-		1.5	33-4	(63)	hard, nonplastic, slow dilatancy, mild HCl reaction, 10% fine to medium sand-sized, <5% limestone
-	16.5				fragments to 1/2", all carbonate materials
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	CT-04	SHEET	2	OF	3

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724456.6 N, 456923.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 4.0 ft bo	ıs on 11/3	30/07	START : 11/29/2007 END : 11/30/2007 LOGGER : T. Borton	
>				STANDARD	SOIL DESCRIPTION	COMMENTS
AND (#)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME LISCS CROLID SYMPOL COLOR	CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DEPTH OF MOISTURE CONTENT, RELATIVE DENSITY OR DEPTH OF	FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	STRUMENTATION
20.8	20.0				Silt With Sand And Limestone (ML)	
		1.2	SS-5	24-32-30 (62)	20.0-21.2' - grayish yellow, (5Y 8/4), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCI	_
	21.5			(- )	reaction, 15% fine to medium sand-sized, 15-20% fine rounded limestone grains, some are knobby	_
-					\connections, carbonate materials	-
-	-				-   -   -   -   -   -   -   -   -   -	-
-	-				-	-
-					-	-
-	_				-	-
25	25.0					-
15.8	25.0 25.3	0.0	SS-6	50/3	No Recovery 25.0-25.3'	
				(50/3") /	] ]	_
_					] ]	_
-	-				_	-
-	-					-
-					-	-
-	_				-	-
-					-	-
30	30.0					-
10.8	30.0				Silty Sand (SM)	_
-		1.3	SS-7	38-51-45 (96)	30.0-31.3' - grayish yellow, (5Y 8/4), wet, very dense, fine to coarse grained, moderate HCl reaction, 30%	-
	31.5			(50)	nonplastic fines, 10-15% fine limestone fragments and grains, carbonate materials	_ _
_					(and grains, carbonate materials	_
-					] ]	-
-	-				-   -	-
-					-	-
-	35.0 35.1	0.0	\ SS-8 /	50/1.5	No Recovery 35.0-35.1'	-
35	00.1			(50/1.5")		-
5.8	1				Begin Rock Coring at 35.0 ft bgs	continue drilling
-					See the next sheet for the rock core log \\Water level 4.0	D' below ground surface
-					1	-
					] [	_
					<u> </u>	-
-					] ]	-
-					-	-
-					-	-
- 40	-				-	-
40					++	



PROJECT NUMBER:

33884.FL

BORING NUMBER:

CT-04

SHEET 3 OF 3

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724456.6 N, 456923.6 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

				TENT . CIVIE 43B 3/N 3313/4, ITIUU TOLAIY, NQ LOOIS, NVV			
WATER	LEVELS: 4.0	ft bgs	s on 1	1/30/07 START : 11/29/2007 END : 11	/30/2	007 LOGGER : T. Borton	
				DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		m	DESCRIPTION	SYMBOLIC LOG	DOOL TYPE OOL OD	
O A P	Z Z Z	_	FRACTURES PER FOOT	BESCIAI HOIV	$\overline{\circ}$	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
A S E	BEE H	D (%)		DEPTH, TYPE, ORIENTATION, ROUGHNESS,	ő	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
무쥬핑	8888	ØΒ	AC R F	PLANARITÝ, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
BS급	8 = 문	R(	FR	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥ	CHARACTERISTICS	DROFS, TEST RESULTS, ETC.
5.8	35.0 R1-NQ				$\vdash$	Limestone	Begin rock coring at 35.0'
_	1 ft	42	>10	35 45 35 65' Fracture zone fine infilling		- 35.0-35.45' - yellowish gray, (5Y 7/2),	_
	36.0 90%			35.45-35.65' - Fracture zone, fine infilling (20-30% of zone)	ш	fine to coarse grained, mild HCl	R1: 2 minutes
				35.7' - Bedding plane, <5 deg, <1/16" open	⊢	reaction, very weak to weak (R1 to	
I -			3	35.8' - Bedding plane, <5 deg, <1/16" open	H	<ul> <li>R2), voids to 1/8" (predominantly</li> </ul>	-
I _				36.2' - Fracture, <5 deg, rough, undulating,		<1/16") over 20-30% of surface,	
				open to 1/4"		fossiliferous (casts/molds)	
-	1		2	36.6' - Bedding plane, <5 deg, rough,	╙	- 35.45-35.9' - Same as 35.0-35.45'	-
l –				undulating, tight	H	except extremely weak (R0)	_
	R2-NQ	00	2	36.75' - Fracture, 70-75 deg, rough,		No Recovery 35.9-36.0' Limestone	
_	5 ft 78%	28	3	undulating, tight	Ш	36.0-39.9' - yellowish gray, (5Y 7/2),	7
_	10/0			36.9' - Mechanical break or fracture, <5 deg,	⊢	fine to coarse grained, mild HCl	_
l _			0	rough, undulating, tight	H	reaction, very weak to weak (R1 to	
40				37.25' - Bedding plane, <5 deg, rough,		R2), with zones of extremely weak	
0.8				undulating, fine to coarse sand sized infill, no opening, open 1/8"-1/2"		(R0) rock at 36.5-36.6' and	R2: 8 minutes
" -			NR	37.7' - Bedding plane, <5 deg, rough,	oxdot	_ 37.5-38.15', voids to <1/16" over	- 12. 0 111110100
	41.0			undulating, tight	$\vdash$	15-25% of surface, fossiliferous	
_				38.2' - Bedding plane, <5 deg, rough,	†	(casts/molds), <5% possible laminar	7
I -			>10	undulating, open 3/16", fine to coarse		_ bedding planes	-
				sand-sized infill, 100% of opening filled	Ь.	No Recovery 39.9-41.0'	
				38.55' - Fracture, 60-70 deg, rough,	⊬	Limestone	Driller's Remark: 100%
-			2	undulating, open	Н	41.0-41.55' - Same as 36.0-39.9'	water loss at 42'
l _				38.9' - Mechanical break		except moderately fossiliferous 41.55-45.2' - yellowish gray	
	R3-NQ		_	41.15' - Bedding plane, <5 deg, rough,		transitioning to pale olive with depth,	
-	5 ft	53	0	undulating, open <1/16"	┢	(5Y 7/2 to 10YR 6/2), very fine to fine	-
I -	84%			41.3-41.55' - Fracture zone, fragments to 1"	⊢	grained, strong to moderate HCl	-
				(predominately <1/2")	П	reaction, weak to medium strong (R2	
45			0	42.1' - Fracture, 65-70 deg, smooth, planar		to R3), trace voids (<1/16"),	7
45 -4.2			1	42.3' - Mechanical break or bedding plane,	╙	fossiliferous (casts and molds),	R3: Run time not recorded
-4.2			-	trace fine infilling	Ь	burrow or solution cavity (3/16"	K3. Run time not recorded
	46.0		NR	45.1' - Mechanical break, 65-75 deg, rough,		diameter) at 42.28'	
I -	40.0			undulating, tight		No Recovery 45.2-46.0'	-
l –			2	45.2' - Fracture, 5 hairline fractures from -	L.	Limestone	_
				45.2' to end of core	Н	46.0-50.0' - Same as 41.55-45.2'	
				46.85' - Bedding plane, <5 deg, rough,	$\vdash$	- except zone of weak (R2) rock from	
-			3	planar, trace fine infilling, open 1/4" -		46.8-46.95', voids (<1/16") increasing with depth, 1" solution cavities at	-
I -				46.95' - Mechanical break, <5 deg, rough,	ш	47.35' and 47.7', trace irregular	
I	R4-NQ			undulating, tight	$\vdash$	bedding planes	
1 -	5 ft	62	0	47.45' - Fracture, 5-15 deg, rough,	⊢	- 2324119 pianoo	-
I -	94%			undulating, open 47.75' - Fracture, <5 deg, closed, does not go	$\Box$	-	
			ا ہا	all the way through			
F0 -	1		1	47.85' - Mechanical break or bedding plane,	⊢⊢	Ī	1
-9.2				<5 deg, rough, undulating, tight	$\vdash$	50.0.50.7' vellowish grov (5V.7/2)	P4: Pun time not recorded —
J.2 _			2	49.55' - Mechanical break or bedding plane,		50.0-50.7' - yellowish gray, (5Y 7/2), medium to coarse grained, mild HCl	R4: Run time not recorded
	51.0		NR	<5 deg, rough, undulating, open <1/16"	Щ	reaction, very weak to weak (R1 to	Total depth of boring is
I -	- 1.0		111	$\uparrow$ 50.0-50.1' - Fracture or bedding plane, <5 $\vdash$		R2), voids <1/16" over 30-40% of	51.0'
-				deg, rough, undulating, open, one large 0.1'	ł	-\ surface, fossiliferous (casts and	Driller's Remark: Water
				angular fragment		(molds)	level is 3.5' below ground surface
I -				50.5' - Mechanical break or bedding plane,	1	No Recovery 50.7-51.0'	Suriace
-				<5 deg, rough, undulating, open <1/16"	ł	Bottom of Boring at 51.0 ft bgs on	
Ι -				_	ı	_ 11/30/2007	
I -							1
1 -				-	1	<b>†</b>	-
I -				<u>-</u>	ı	L	_
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-05	SHEET	1	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723052.6 N, 456340.9 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLIN	DRILLING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical											
WATER	LEVELS	: 4.4 ft bo	s on 11/	14/07	TART : 11/12/2007 END : 11/14/2007 LOGGER : J. Schaeffer, T. Borton							
200				STANDARD	SOIL DESCRIPTION COMMENTS							
ELO N (f	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION							
TH B FACE MATIC		RECOVE	.,		MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY							
DEPTH BELOW SURFACE AND ELEVATION (ft)				6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY							
41.5	0.0				Poorly Graded Sand With Organics (SP)  9 0 0 0 1 pole well-aviable have (10VP 6/0) point.  Begin drilling on 11/12/07 at 16:00							
		0.9	SS-1	1-1-2 (3)	0.0-0.9' - pale yellowish brown, (10YR 6/2), moist, very loose, very fine to fine grained, no HCl reaction,							
	1.5			(0)	\ silióa sand, trace nonplastic fines, 5-10% organics \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \							
_												
_												
-												
-												
-					-							
	5.0											
5 36.5	5.0				Poorly Graded Sand With Clay (SP-SC) 5.0-5.5' SS-2A							
-		1.0	SS-2	2-2-2	5.0-5.5' - dark yellowish orange, (10YR 6/6), moist to wet, very loose, fine grained, 9% moderate plasticity 5.5-6.0' SS-2B							
-	6.5			(4)	∫ fines, silica sand							
-	0.0				Fat Clay (CH) 5.5-6.0' - grayish blue green, (5BG 5/2), moist, soft,							
					\high plasticity, no dilatancy, no HCl reaction, 5-10% /							
					very fine to fine silica sand, trace rootlets							
					<b>_ _</b> _							
_												
_												
10 <u> </u>	10.0				Silty Sand (SM) 10.0-10.2 SS-3A							
- 01.5		0.9	SS-3	2-3-5	│ \ 10.0-10.2' - light greenish gray, (5GY 8/1), wet, loose, │ - │ │							
-	44.5	0.9	33-3	(8)	\fine to coarse grained, strong HCl reaction, sand is							
-	11.5				Silty Sand (SM)							
-					10.2-10.9' - yellowish gray, light greenish gray, and light bluish gray, (5Y 8/1, 5GY 8/1, and 5B 7/1), wet,							
-					loose, irregularly bedded sands, predominately very fine to fine silica sands, up to 25% fine to coarse sand							
-					as in 10.0-10.2' (fossils), 15% nonplastic fines, strong							
					HCI reaction in fossil materials							
					]							
15	15.0											
26.5	15.7	0.7	SS-4	34-50/2 (84/8")	Silt And Limestone (ML) 15.0-15.7' - grayish orange, (10YR 7/4), wet, hard,							
-	_			(= , = ,	nonplastic, rapid dilatancy, moderate HCl reaction, 49% coarse sand-sized and fine gravel-sized							
-					\limestone fragments, strong HCI reaction in the   -							
-					limestone, all carbonate materials							
-												
-												
-												
_					<b>                                   </b>							
20					<b>1  </b>							



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-05	SHEET	2	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723052.6 N, 456340.9 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLIN	DRILLING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical											
WATER	LEVELS	: 4.4 ft bo	s on 11/	14/07	TART : 11/12/2007 END : 11/14/2007 LOGGER : J. Schaeffer, T. Borton							
2001				STANDARD	SOIL DESCRIPTION COMMENTS							
ANG (#	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, 으로 DEPTH OF CASING, DRILLING RATE,							
H BE ACE ATIC		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR  DEFTH OF CASING, DRILLING RATE,  DRILLING FLUID LOSS, TESTS, AND							
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION							
21.5	20:9	0.4	SS-5	26-50/0.5	Silt And Limestone (ML)  Resume drilling at 08:12 on 11/13/07							
				(76/6.5")	20.0-20.4' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, mild HCI reaction, 60% silt							
					\ and 40% limestone, limestone is fine to coarse							
					sand-sized fragments, friable, mild HCl reaction, one   -							
					08:47 3" NW casing installed to 20.0'							
					<b>1  </b>							
					]							
25	25.0											
16.5				29-45-27	Silt With Sand And Limestone (ML) 25.0-26.2' - grayish orange, (10YR 7/4), wet, hard, -       Possible slough top of sample, 3 angular to subangular fragments up to 1.0", strong HCl							
_		1.2	SS-6	29-45-27 (72)	nonplastic, rapid dilatancy, mild HCl reaction, 15-25%							
_	26.5			` '	fine to medium sand-sized varies throughout sample, 25% fine gravel-sized limestone fragments, carbonate							
_					materials							
_					<b>.</b> .							
-												
_												
_												
-												
30 <u> </u>	30.0				Limestone Fragments And Silt (ML) 20 blows first 6.0" then rods fell 11.0",							
-		0.5	CC 7	20-0-4	↑ 30.0-30.4' - grayish orange, (10YR 7/4), 75%							
-		0.5	SS-7	(4)	limestone in fine to coarse gravel-sized fragments, mild HCl reaction, 25% silt which is wet, soft,  Driller's Remark: Cavity in rod drop zone Soil descriptions for sample SS-7 assumes							
-	31.5				¬∖nonplastic, rapid dilatancy, mild HCl reaction,							
-					\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\							
-					Sandy Silt (ML) 10:03 Casing advanced to 30'							
-					31.4-31.5' - grayish orange, (10YR 7/4), wet, soft, nonplastic, rapid dilatancy, mild HCI reaction, 35%							
-					fine to coarse sand-sized, carbonate materials							
-					<b>- 1  </b>							
35	35.0				<b>†  </b>							
6.5	55.0			22_51_50/0_5	Silty Sand With Limestone (SM) 10:35 Casing advanced to 35.0'							
		1.2	SS-8	23-51-50/2.5 (101/8.5)	→ 35.0-35.5' - grayish orange, (10YR 7/4), wet, very dense, fine to coarse grained, moderate HCl reaction,							
	36.2				$-\sqrt{26}$ % nonplastic fines, 32% fine to coarse gravel-sized / $-\sqrt{111}$							
					\limestone fragments, all carbonate materials   -							
]					\ 35.5-36.2' - dark yellowish orange, (10YR 6/6), wet,							
					very dense, fine to coarse grained, moderate HCl reaction, 30-35% nonplastic fines, 5-10% fine							
					gravel-sized limestone fragments, all carbonate materials Driller's Remark: 100% water loss at 38.0'							
					<b>.</b>							
40												



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-05	SHEET	3	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723052.6 N, 456340.9 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS			14/07 S	START: 11/12/2007 END: 11/14/2007 LOGGER: J. Schaeffer, T. Borton	
				STANDARD	SOIL DESCRIPTION COMMEN	ITS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL DESONIT FION  SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, I DRILLING FLUID LOS INSTRUMEN	
JEEL JON		RECOVE	ERY (ft)	12011120210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, I	ORILLING RATE,
PTH JRFA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	TATION
월 3 1.5	40.0			(N)		
1.5	40.0			15-8-6	Silty Sand (SM) 40.0-41.3' - moderate yellowish brown to dark	-
_		1.3	SS-9	(14)	yellowish brown, (10YR 5/4 to 10YR 4/2), wet,	-
_	41.5				medium dense, fine to coarse grained, mild to moderate HCl reaction, 25% nonplastic fines, 10-15%	-
_					fine gravel-sized limestone fragments, all carbonate   _	-
_					Inaterials	-
_						-
_					- Duillanda Damandu Chatta	40 51
_					Driller's Remark: Chatter	- ai 43.5 -
_	45.0					-
45 -3.5	45.2	0.0	SS-10	50/2.5	No Recovery 45.0-45.2'	
-5.5	43.2			(50/2.5")	Begin Rock Coring at 45.0 ft bgs See the next sheet for the rock core log	-
-					See the next sheet for the rock core log	-
-						-
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50 -8.5					-	_
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

CT-05

SHEET 4 OF 5

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723052.6 N, 456340.9 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

				MENT . CIVIE 43B 3/N 331374, Mud Totally, NQ tools, NVV	00.0	9	ORIENTATION : Vertical
WATER	LEVELS: 4.4	ft bg	s on 1	1/14/07 START: 11/12/2007 END: 11	/14/2	DO7 LOGGER: J. Schaeffer, T. Borton	n
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		<i>(</i> 0	DESCRIPTION	SYMBOLIC LOG		
	ÄA×		₩-	DESCRIPTION	J	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
# # # # # # # # # # # # # # # # # # #	N F. I	(%) Q	28	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	딩	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
F F >>	# <sub>2</sub> 50	OΩ	R P	PLANARITY, INFILLING MATERIAL AND	₩	AND ROCK MASS	SMOOTHNESS, CAVING ROD
	SHR	R	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	45.0 R1-NQ				H	Limestone	Casing set at 45.0'
	1 ft	33	3	45.35, 45.58' - Mechanical break (2), 10-15		- 45.0-46.5' - light olive gray, (5Y 6/1),	Begin coring with NQ, hard -
	46.0 100%	00		deg, rough, undulating, tight		fine to medium grained, moderate	formation bit
-	40.0			45.76' - Bedding plane, <5 deg, rough,	ऻ	HCl reaction, weak (R2), strong HCl	Driller's Remark: Water
_			>10		₽	<ul> <li>reaction where pulverized, highly</li> </ul>	level approximately 7.0'
				46.15-46.3' - Fracture zone, subangular	Н	fossiliferous (casts/molds over	below ground surface
_				limestone fragments (up to 1-1/2")		40-50% of sample), voids (up to	08:11 Begin drilling first run
-			1	46.45' - Bedding plane, <5 deg, rough,		<ul> <li>1/16") over 10-15% of surface, trace</li> </ul>	on 11/14/07 –
				undulating		voids up to 1/2"	First run only 1 foot to set
	R2-NQ			46.8' - Fracture, 80-90 deg, rough, undulating	₽	46.5-50.5' - Same as 45.0-46.5'	stroke
-	5 ft	57	2	47.1' - Mechanical break or bedding plane,	+	<ul> <li>except fine grained, very weak (R1),</li> </ul>	R1: 4 minutes –
_	90%			<5 deg, smooth, stepped		transitions to yellowish gray (5Y 5/2)	_
1				48.1, 48.5, 48.85' - Mechanical break (3), <10		with depth (by 48.9'), 15-25% fossils	1
			3	deg, rough, undulating	╄	- (casts/molds), voids (up to 1/16")	Driller's Remark: Softer at
50				49.0' - Mechanical break or bedding plane,	╀	over 5-10% of surface increasing to	49.5' —
-8.5			2	<10 deg, rough, undulating		15-25% with depth	R2: 27 minutes
1 -			NR	49.5, 49.6' - Mechanical break or bedding plane (2), <10 deg, rough, undulating	亡	No Recovery 50.5-51.0'	
-	51.0		INIC	50.0' - Fracture, 5-15 deg, rough, undulating	ш	_	-
			_	50.4' - Mechanical break, 5-10 deg, rough,	$\vdash$	Limestone	
			0	undulating	₽	<ul> <li>51.0-53.85' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to</li> </ul>	1
-				- and all all all all all all all all all al	H	medium grained, mild to moderate	Driller's Remark: Soft at
_			2			HCl reaction, very weak (R1),	52.0'
			-	52.5' - Mechanical break, <5 deg, rough,		fossiliferous (casts/molds), voids (up	32.0
_	R3-NQ			undulating, tight	╁	to 1/16") over 15-25% of surface	1
_	5 ft	39	>10	52.75' - Mechanical break or bedding plane,	-	-	1
	57%			<5 deg, rough, undulating, tight			
_				53.15-53.75' - Fracture zone, general	1	No Recovery 53.85-56.0'	1
-				orientation 75-85 deg with multiple breaks <5 deg, possibly many mechanical breaks or	₽	-	-
55			NR	bedding planes along a long fracture, —	丁		
-13.5				limestone fragments up to 2-1/2"			R3: 9 minutes
_					╙	-	Driller's Remark: Harder at -
l –	56.0			-	+ -	- 15	55.0', no circulation
			2	56.1, 56.5' - Bedding plane (2), <5 deg,		Limestone	
			-	rough, undulating, tight to open <1/16"		<ul> <li>56.0-61.0' - yellowish gray, (5Y 7/2), fine to medium grained, mild to</li> </ul>	
-				-	Ъ.	moderate HCl reaction, very weak to	l <del>1</del>
_			2		+-	- weak (R1 to R2), weak (R1) rock at	_
			-	57.7' - Mechanical break, 1-5 deg, rough,	Ш	58.5-58.8', fossiliferous (casts and	l l
1 -	R4-NQ			undulating, tight	1	trace molds), voids (up to 1/16") over	1
-	5 ft	62	2	57.9' - Bedding plane, <5 deg, rough, planar,	╀	<ul> <li>5-15% of surface decreasing with</li> </ul>	-
I -	100%			tight	$\bot \lnot$	depth	]
			.	58.3' - Fracture, 5-10 deg, smooth, planar,	亡		l l
-			2	open <1/16", trace infill (fines)	╙	_	1
60			<u> </u>	58.9' - Mechanical break, <5 deg, rough,	╀	_	D4: 44
-18.5			3	undulating, tight			R4: 11 minutes
1	61.0		3	59.55' - Bedding plane, 5-10 deg, rough, undulating, open 1/8"			1
-	01.0			59.75' - Mechanical break or bedding plane,	╀	61.0-66.0' - yellowish gray to dusky	-
-			2	<5 deg, rough, undulating, tight	╀	- yellow, (5Y 7/2 to 5Y 6/4), fine to	] _
			-	60.1' - Fracture, <5 deg, rough, undulating,		medium grained, mild to moderate	l l
1 -				open 1/8"	匚	HCl reaction, very weak to weak (R1	Driller's Remark: Water
-			5	60.3' - Mechanical break, <5 deg, rough,	╀	<ul> <li>to R2), very weak (R1) rock</li> </ul>	level at 4.4'
I _				undulating, tight	$\vdash$	transitions with depth to weak (R2)	]
	R5-NQ			60.8' - Fracture or bedding plane, <5 deg,	E'	rock, voids (up to 1/16") over 5-15%	1
1 -	5 ft	52	2	rough, undulating, open 1/4"-1/2", less than	仜	<ul> <li>of surface decreasing with depth,</li> </ul>	
-	100%		<u> </u>	1/2" fragment in opening 61.07' - Mechanical break or bedding plane,	╀	trace fossils (casts/molds)	-
					$\vdash$		l l
65			>10	1 5 deg, rough, unduiduity, open > 1/10	Ш		1
- 00					1		
1					1		
					1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-05	SHEET	5	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723052.6 N, 456340.9 E (NAD83)

ELEVATION: 41.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

WATER	LEVELS : 4.4	1 ft bas	s on 1	1/14/07 START : 11/12/2007 END : 11	/14/:	200	D7 LOGGER : J. Schaeffer, T. Bortor	1
				DISCONTINUITIES		Т	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES-	DESCRIPTION	SYMBOLIC LOG	Γ	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACINO
ACE (TIO)	RUJ TH, 4	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,			MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
FF.	ORE INGI	αD	AAC]	PLANARITY, INFILLING MATERIAL AND	WB	ı	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	8.2	22	E E	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	1	CHARACTERISTICS	
-23.5			0	61.8' - Mechanical break, <5 deg, rough, undulating, tight	H	╁		R5: 10 minutes
l _	66.0			62.1' - Mechanical break or bedding plane,	Ш	Ł		Total depth of boring 66.0',
l _				<5 deg, rough, undulating, tight 62.25' - Mechanical break, <5 deg, rough,	1	L	Bottom of Boring at 66.0 ft bgs on 11/14/2007	work plan criteria met
l _				undulating, tight		L	11/14/2007	_
l _				62.9, 63.0 - Mechanical break or bedding plane (2), <5 deg, rough, undulating, tight		L		_
_				63.15' - Bedding plane, <5 deg, rough,	1	L		_
_				undulating, tight 63.7, 64.1' - Mechanical break (2), <5 deg,	1	L		Total 20 bags Portland Type I/II coated bentonite -
_				rough, undulating, tight	1	L		chips from 23.0-16.0' below
_				64.43' - Mechanical break or bedding plane, <5 deg, rough, undulating, open 1/8"		L		ground surface 3/4 bag bentonite, 100 –
_				64.72-65.05' - Fracture zone, no orientation,	1	L	_	gallons of water
_				limestone fragments up to 1/2"	1	L		17:11 Grout to surface –
-				-	1	ŀ		=
_				-	1	ŀ		=
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-06	SHEET	1	OF	7	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722977.3 N, 456619.7 E (NAD83)

ELEVATION: 41.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 3-7/8" drag bit

WATER	LEVELS	: 0.5 ft bo	s on 11/	13/07	START : 11/12/2007 END : 11/14/2007 LOGGEF	₹ : P.	De Sa'rego
				STANDARD	SOIL DESCRIPTION	g	COMMENTS
AND N (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LICCS CROUD SYMBOL COLOR	C LO	DEPTH OF CASING DOULING DATE
A SCE	RECOVERY (ft)				SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30 Li	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
41.4	0.0			(14)	¬ Topsoil	NI,	
-		1.5	SS-1	3-4-6	\(\bigcup_0.0\cdot-0.2\cdot\) - wood chips, no roots, silica sand \(\begin{array}{c} -\bigcup_0\cdot\) - \(\bigcup_0\cdot\) Poorly Graded Sand (SP)		-
-	1.5			(10)	0.2-1.5' - pale vellowish brown, (10YR 8/2), moist,		1
-					loose, fine grained, no HCl reaction, silica sand, trace / nonplastic fines, organic matter at 0.2-0.4'		1
							]
_					_		_
_					_		_
_					-		_
5 36.4	5.0				Poorly Graded Sand (SP)		
-			SS-2	3-4-5	5.0-6.1' - very pale orange to grayish orange, (10YR -		-
-		1.1	55-2	(9)	8/2 to 10YR 7/4), wet, loose, fine grained, no HCl		-
-	6.5				roots	ł	-
-					-	ł	1
-	-				-	l	=
-	-				-	1	1
-	:				-	1	1
-					_	1	1
10	10.0						
31.4				4-4-5	Poorly Graded Sand (SP) 10.0-11.4' - yellowish gray, (5Y 8/1), wet, loose, fine -		
_	-	1.4	SS-3	(9)	grained, no HCl reaction, silica sand, trace nonplastic		_
-	11.5				fines		4
-					-	ł	-
-	_				-	ł	-
-					-	ł	-
-					-	ı	1
-	1				-	1	1
15	15.0				-	1	-
26.4	10.0				Sand Silt (ML)	Ш	
		1.3	SS-4	4-5-6 (11)	15.0-16.3' - light gray, (N7), wet, stiff, nonplastic, no HCl reaction, 38% fine grained silica sand		]
	16.5			(,		Ш	]
_					_	1	]
-					-	1	
-					-	-	_
-					-	-	-
-	-				-	1	-
-	-				-	1	-
20_						$\vdash$	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-06	SHEET	2	OF	7	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722977.3 N, 456619.7 E (NAD83)

ELEVATION: 41.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 3-7/8" drag bit

DRILLIN	G METH	DD AND	EQUIPM	ENT : CME 550 S	N 186073, mud rotary, cathead, AWJ rods, 3-7/8" drag bit ORIENTATION: Vertical
WATER	<u>LEVELS</u>	: 0.5 ft bo	gs on 11/	13/07 S	TART: 11/12/2007 END: 11/14/2007 LOGGER: P. De Sa'rego
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
BEL ON		RECOVE	RY (ft)	TEST NESOLIS	SOIL NAME, USCS GROUP SYMBOL, COLOR,  DEPTH OF CASING, DRILLING RATE,
TH YEAC			#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
SUI			<i>"</i> · · · · <u>-</u>	(N)	
21.4	20.0				Sandy Fat Clay (CH)  Stop SPT for the day 11/12/07 at 17:00
		1.3	SS-5	3-4-2 (6)	20.0-20.5' - very light gray with very pale blue mottling, (N8 with 5B 8/2), wet, medium stiff, high
-	21.5			(0)	\plasticity, no dilatancy, no HCl reaction, 25-30% very \ \frac{1}{1}\} Water level 0.5' below ground surface
-					\fine to fine grained silica sand Silty Sand (SM)
-					20.5-21.3' - very light gray. (N9), wet, loose, fine
-					grained, no HCl reaction, silica sand, 30% low
-					plasticity fines
-					
-					<del>      -</del>
	o= -				
25 16.4	25.0				Fat Clay (CH) Weight of hammer drove SS-6 (25.0-25.6')
-		0.0	00.0	0-0-0	_ 25.0-25.6' - pale brown, (5YR 5/2), wet, soft, medium through all 18" for SPT
-	_ 0.6   SS-6			(0)	to high plasticity, slow dilatancy, no HCI reaction, trace fine grained silica sand, final 0.05' of sample
-	26.5				consists of compacted silica sand or fine grain
_					sandstone
_					- Dillanta Davandu 050/ Jana of signalation at
-					Driller's Remark: 25% loss of circulation at 27.5', some drill chatter
_					
_					<b>.</b> .
_					]
30	30.0				
11.4		0.6	SS-7	31-50/4.5	<b>Silt (ML)</b> 30.0-30.6' - grayish orange, (10YR 7/4), wet, hard,
	30.9	0.0	00 /	(81/10.5")	\ nonplastic, rapid dilatancy, mild HCl reaction, 7% fine /
					to medium sand sized, all carbonate materials
					11
					11
-					11
-					11
-					11
-					11
35	35.0				11
6.4	JJ.U				Silty Sand (SM)
-		0.7	SS-8	25-32-29	35.0-35.7' - gravish orange. (10YR 7/4). wet. dense
-	00.5	0.7		(61)	fine to coarse grained, mild to moderate HCl reaction, 25% nonplastic fines, 5-10% fine gravel-size
-	36.5				limestone fragments, all carbonate material
-					
-					
-					
-	40.0				End SPT soil sampling
-	40.3	0.1	SS-9	50/3.5	Limestone Fragments /= Switching to rock coring at 09:20 (refusal -
-				(50/3.5")	\\ddot 40.0-40.1' - moderate yellowish brown, (10YR 5/4),   blow count, limestone fragments)
40					7 0 1
					Begin Rock Coring at 40.0 ft bgs See the next sheet for the rock core log
					coo the flext check for the rook dore log



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338884.FL	CT-06	SHEET	3	OF	7	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722977.3 N, 456619.7 E (NAD83)

ELEVATION: 41.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS : 0.5	ft ba	s on 1	1/13/07 START : 11/12/2007 END : 11	/14/2	007 LOGGER : P. De Sa'rego	
				DISCONTINUITIES	Ŋ	LITHOLOGY	COMMENTS
ANC (#	ŽAN QN Y (%)		ES	DESCRIPTION	) LO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP!	COR	R Q	FRAC PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMI	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
1.4	40.0			40 21 Machanical brook	İ	Limestone	Begin coring from 40.0' at
-	R1-NQ 1.5 ft	29	1	40.2' - Mechanical break 40.4-40.8' - Fracture, 80 deg, rough,	ь	<ul> <li>40.0-40.8' - grayish orange, (10YR 7/4), fine grained, moderate HCl</li> </ul>	10:30, 11/13/07 – (depth of coring start
-	40% 41.5		NR	undulating, open	Ш	reaction, weak (R2), voids (1/16")  over 10% of core surface, trace casts	adjusted to remove 0.5' of
					$\vdash$	to 1/4"	slough counted on the field - log)
l .				_	$\vdash$	No Recovery 40.8-46.5'	R1: 8 minutes Driller's Remark: No
_				<u>-</u>	F	<del>-</del>	resistance to drilling at
-	DO NO			-		=	41.5-46.5', no circulation loss
-	R2-NQ 5 ft	0	NR	-	F	_	Driller's Remark: Stop to clean mud at 11:30, too
	0%			-	Ħ	-	much silt/fines –
45 -3.6	-			<del>-</del>	Ħ	_	-
-	-			-	Ħ	-	R2: 3 minutes
-	46.5			-	Ħ	-	1
-	10.0		_	46.6' - Mechanical break	Ľ	Limestone	1
	]		5	46.7-46.8' - Fracture, 45 deg, rough, undulating, open		<ul> <li>46.5-48.5' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, weak</li> </ul>	Driller's Remark: Soft at 47.0-48.5', 100%
			4	47.1-47.2' - Fracture (3), horizontal, rough, undulating, loose fragments 1" in size, open	H	to medium strong (R2 to R3), trace to 10% voids up to 1/16", trace cavities	circulation lost at 47.0'
-			·	47.4' - Fracture, 30 deg, rough, planar, 1/4"	₽	up to 3/4"x1-9/16", partly infilled with	_
-	R3-NQ 5 ft	13		open 47.7' - Fracture, horizontal, smooth,	₽	fossiliferous carbonate material  No Recovery 48.5-56.5'	-
	40%			undulating, <1/16", open, related to cavity at 47.7'	Н	-	-
50 -8.6	-		NR	47.9' - Fracture, horizontal, rough, undulating, —	₽	_	-
-	1			open 47.9-48.1' - Fracture, 60 deg, rough,	F	-	R3: 16 minutes
-	51.5			undulating, 1/8" relief 48.4' - Fault, horizontal, smooth, planar to	H	<u> </u>	-
				undulating, <1/8" relief	Н	_	Driller's Remark: Soft
					F	_	throughout run R4, still no circulation
_				_	Щ	_	_
-	. DANO			-	厂	-	_
-	R4-NQ 5 ft	0	NR	-	上	_	-
	0%			-	士	_	-
-13.6	-			_	士	_	-
-	-			-	Ь	-	R4: 4 minutes
-	56.5			<del>-</del>	$\perp$	-	1
-			3	56.65' - Fracture, horizontal, rough,	上	_ Limestone	1
	]			undulating, 1/8" open 56.9' - Fracture, 10 deg, rough, undulating,	$\vdash$	56.5-57.4' - grayish orange, (10YR - 7/4), fine to medium grained, mild	]
] .				1/8" open		HCl reaction, weak (R2), voids to	]
] -	DE NO.			57.0' - Mechanical break 57.1-57.3' - Fracture, 60 deg, rough,	仠	1/16" over 15% of core surface, trace fossil casts and cavities up to 3/8" at	-
-	R5-NQ 5 ft	0		undulating to planar, black staining over 80% of surface	F	56.5-56.8' No Recovery 57.4-61.5'	-
	18%		NR		F		-
60_					Ħ		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-06	SHEET	4	OF	7	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722977.3 N, 456619.7 E (NAD83)

ELEVATION: 41.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS: 0.5	ft bg	s on 1	1/13/07 START : 11/12/2007 END : 11	/14/2	2007 LOGGER : P. De Sa'rego	
>00	6)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-18.6 - -	61.5					-	R5: 10 minutes
65 -23.6	R6-NQ 5 ft 28%	0	0 0 NR			Silt With Sand (ML) 61.5-62.9' - grayish orange, (10YR 7/4), wet, hard, nonplastic, mild HCI reaction, 15% fine to very fine sand-sized particles, all carbonate material No Recovery 62.9-71.5'	No SPT taken
-0 -0 -0 -0 -28.6	66.5 R7-NQ 5 ft 0%	0	NR	- - - - -		- - - - - -	Stop for day 11/13/07 at 17:00
- - - - - - - - - - - - - - - - - - -	71.5 R8-NQ 5 ft 80%	0	>10 2 2	71.1' - Fracture, horizontal, rough, undulating, 1/4" open 71.8-72.0' - Fracture zone, rock fragments 72.3' - Mechanical break 72.8' - Fracture, horizontal, rough, undulating, 1/2" open 73.1' - Mechanical break 73.2' - Fracture, 0-30 deg, rough, undulating, tight, variable angle 73.9' - Fracture, horizontal, rough, undulating, tight		Limestone 71.5-75.5' - grayish orange, (10YR 7/4), medium grained, mild HCI reaction, extremely weak (R0), no visible voids or cavities	Driller's Remark: Rock fragments lodged in core barrel, likely destroyed sample – Driller's Remark: Soft at 71.5-74.5', increased resistance from 74.5-76.5' –
-55.0	76.5		NR	74.0' - Fracture, horizontal, rough, undulating, tight 74.8' - Mechanical break 74.9' - Mechanical break		No Recovery 75.5-76.5'	R8: 10 minutes - Driller's Remark: - Circulation loss (100%) at
- - - - 80	R9-NQ 5 ft 62%	23	2 76.7' - Fracture, horizontal, rough, undulating, 1/8" open 77.45' - Fracture, 10 deg, rough, undulating, 1/8" open 77.7-77.85' - Fracture zone, fine to coarse sand-sized and gravel-sized fragments 78.3' - Fracture, horizontal, rough, undulating, 1/4" open			- 76.5-78.2' - grayish orange, (10YR 7/4), fine to medium grained, mild HCl reaction, weak (R2), trace voids up to 1/16", trace cavities to 3/4"x3/8" 78.2-79.6' - grayish orange, (10YR 7/4), fine to medium grained, mild HCl reaction, extremely weak (R0), no visible voids or cavities  No Recovery 79.6-81.5'	Circulation loss (100%) at 76.0' Driller's Remark: Medium resistance from 76.5-78.5' Driller's Remark: Hard at 78.5-81.8' Driller's Remark: Soft at 81.5-83.0' Driller's Remark: Hard at 83.0-84.5'



PROJECT NUMBER:

338884.FL

BORING NUMBER:

CT-06

SHEET 5 OF 7

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722977.3 N, 456619.7 E (NAD83)

ELEVATION: 41.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

				12.111 . CIVIL 330 3/14 1000/3, midd 10tary, 14Q tools, 1444		5	ONLIVIATION: Vertical
WATER	LEVELS: 0.5	ft bg	s on 1	1/13/07 START : 11/12/2007 END : 11	/14/2	007 LOGGER : P. De Sa'rego	
>	(9)			DISCONTINUITIES	ŋ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	100	ROCK TYPE, COLOR,	
ᆱ핑힏	ER, A	(%	N P		1 3	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
ΗĞĞ	# <u>F</u>	(%) <sub>Q</sub>	FCT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	ВВ	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
		ď	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-38.6	<u> </u>	_		78.9' - Fracture, horizontal, rough, undulating,	+ "		
-			NR	tight		<b> </b> -	
1 -	]			79.5' - Fracture, 20 deg, rough, undulating,	₽	_	R9: 11 minutes
	81.5			1/8" open			
1 -				81.5-82.1' - Fracture zone, fine to coarse	Ъ	Limestone	1
-	1		>10	sand-sized and fine to coarse gravel		- 81.5-83.1' - grayish orange, (10YR 7/4), fine grained, mild HCl reaction,	1
-	1			fragments 82.1-82.4' - Fracture, 70 deg, rough,	╙	weak (R2), trace voids to 1/16"	-
-			1	undulating, opposing face fractured	+	<b> </b>	-
1 -	]			82.4-82.5 - Fracture, 45 deg, rough,		No Recovery 83.1-86.5'	
	R10-NQ			undulating, 1/4" open 83.0' - Mechanical break	H		
	5 ft 32%	8		65.0 - Mechanical break	ш	Ī	
0.5	1 02/0		NR		╁	f	Driller's Remark: Soft at
85 <u> </u>	1		INIX	_		<b> -</b> -	84.5-85.5' —
-					₩	-	B40: 6 minutes -
l -	]				ш	_	R10: 6 minutes
	86.5				Н		Driller's Remark: Hard at
1 -				86.5-87.1' - Fracture zone, two dominant 60	╁	Limestone	85.5-86.5' – Driller's Remark: Medium
-			>10	deg fractures, at 86.5-86.7' and 86.7-87.0', rough and undulating surfaces, multiple	仜	- 86.5-90.2' - grayish orange, (10YR 7/4), fine grained, moderate HCl	drilling at 86.5-88.0'
-				fragments of fine gravel size	$+ \top$	reaction, weak (R2), 10-15%	-
-	.		1			<ul> <li>coverage of voids up to 1/16", trace</li> </ul>	Drillaria Damariki Hard at
_				88.05' - Fracture, horizontal, rough, undulating, opposite face at 60°; open	₽	cavities up to 3/8"x-9/16", cavities	Driller's Remark: Hard at 88.0-91.5'
1 _	R11-NQ	32	>10	88.5-88.8' - Fracture zone, several medium	ш	increasing in frequency with depth	
	5 ft 74%	32	- 10	gravel-sized fragments, terminates at 60 deg	$\vdash$		
90			0	face		<u>†</u>	1
-48.6	1			89.1-89.4' - Fracture zone, medium to coarse _ gravel-sized fragments	╁	No Bosovery 00 2 04 5'	_
-	- 1			grand diagrams	ш	No Recovery 90.2-91.5'	R11: 15 minutes
-		NR NR		-		-	-
-	91.5					1	
			_10	91.5-91.9' - Fracture zone, medium to coarse	$\vdash$	Limestone	
1 -	]		>10	gravel-sized fragments 92.2' - Fracture, horizontal, rough, undulating,	П	- 91.5-92.5' - grayish orange, (10YR 7/4), fine grained, moderate HCl	1
-				1/4" open	⊣	reaction, weak (R2), 15% coverage	1 1
-				· ·	亡	of voids up to 1/16", trace	1
-	R12-NQ				╀	cavities/fossil molds up to 1/4"x3/16"  No Recovery 92.5-96.5'	1
-	5 ft	0			仜	-	1 4
1 _	20%		NR		$\vdash$	_	
95			'\'\				
-53.6	1			_	$\vdash$		
-					tr	†	R12: 6 minutes
-					仠	<del> </del>	1
-	96.5				世		1
-			>10	96.7-97.2' - Fracture zone, coarse	П	<b>Limestone</b> - 96.5-96.7' - Same as 91.5-92.5'	Driller's Remark: Rock
	]			gravel-sized fragments	┰	96.7-97.2' - very pale orange, (10YR	fragments stuck in core barrel at 98.0'; removed
1 -			NR		F	8/2), fine grained, mild HCl reaction,	barrel to clear, resumed
1 -	1		1	98.1' - Fracture, 10 deg, rough, undulating,	╨	<ul><li>medium strong (R3)</li><li>No Recovery 97.2-97.9'</li></ul>	coring 98.0-101.5'
-	R13-NQ			open	仜	Limestone	Core loss assumed to be 97.2-97.9': lithologic
-	5 ft	35	>10	98.6' - Fracture, horizontal, smooth,	$\vdash$	- 97.9-99.3' - Same as 96.7-97.2'	description intervals
-	86%			undulating, 1/4" open		except 2 large cavities (3-7/8"x3/8") at 98.9-99.2'	adjusted accordingly
100					片	at 30.3-33.2	
					1		



PROJECT NUMBER:

33884.FL

BORING NUMBER:

CT-06

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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722977.3 N, 456619.7 E (NAD83)

ELEVATION: 41.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

MODE   ボエッ   8   50   DEPTH, TYPE, ORIENTATION, ROUGHNESS, UP OF SMOO	COMMENTS  AND DEPTH OF CASING,
DESCRIPTION  DESCR	AND DEPTH OF CASING
	OSS, CORING RATE AND OTHNESS, CAVING ROD S, TEST RESULTS, ETC.
-58.6   >10   99.1-99.3' - Fracture zone, fine to large   Limestone   99.3-101.5' - moderate vellowish	5 minutes -
tight 1 tight 101.9' - Fracture, horizontal, rough, undulating, 1/8" open 102.8 403.0' Fracture area ground sized 103.8 403.0' Fracture area ground sized 103.8 403.0' Fracture area ground sized 103.8 403.0' Fracture area ground sized	-
R14-NQ S ft 28 80%	- - -
105	minutes -
1/8" open 104.2' - Mechanical break 104.5' - Fracture, 10 deg, rough, undulating, 1/8" open 104.8-105.0' - Fracture zone, coarse  1/8" open 104.8-105.0' - Fracture zone, coarse  1/8" open 1/4, fine grained, mild HCl reaction, weak (R2), 10% coverage of voids	- - -
gravel-sized fragments 105.1-105.3' - Fracture, 60 deg, rough, undulating, tight 17 2 gravel-sized fragments 105.1-105.3' - Fracture, 60 deg, rough, undulating, tight 106.5-107.4' - Fracture zone, gravel-sized 106.5-107.4' - Fracture zone, gravel-sized	- - -
110 -68.6 NR Undulating, 1/8" open 108.4" - Fracture, horizontal, rough, undulating open	minutes -
111.6-111.7' - Fracture zone  112.1-112.2' - Fracture zone  112.1-112.2' - Fracture zone  112.1-112.2' - Fracture zone  113.6-111.7' - Fracture zone  114.6-111.7' - Fracture zone  115.112.6' - grayish orange, (10YR 7/4), fine grained, mild HCI reaction, weak (R2), 10% coverage of voids up to 1/16", single 1-9/16"x1-9/16" cavity at 111.9', deep spherical cavity	- - -
R16-NQ 5 ft 15 22% NR NR	minutes
116.5  116.5-117.5' - unconsolidated silts/sands  0  116.5-117.5' - unconsolidated silts/sands  - \( \begin{array}{cccccccccccccccccccccccccccccccccccc	minutes - - - -
R17-NQ Still 0 >10 117.8' - Fracture, 80 deg, rough, undulating, tight 118.0-119.5' - Fracture zone or mechanical break 118.0-119.5' - Fracture zone or mechanical break 118.0-119.5' - Fracture zone or mechanical break 117.5-118.1' - grayish orange, (10YR 7/4), fine grained, mild HCl reaction, weak (R2), trace voids to 1/16"	- - -
120 weak (KZ), trace voius to 1/10	



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722977.3 N, 456619.7 E (NAD83)

ELEVATION: 41.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

CORING	METHOD A	ND FO	JUIPN	IENT: CME 550 S/N 186073, mud rotary, NQ tools, NW	casın	g	ORIENTATION : Vertical
WATER	LEVELS : 0.5	ft ba	s on 1	1/13/07 START : 11/12/2007 END : 11	/14/2	007 LOGGER : P. De Sa'rego	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
중무율	(%)				8		002.11.0
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-78.6 -			NR	119.5' - Fracture, horizontal, rough, undulating, open -	H	<b>Limestone</b> - 118.1-119.5' - Same as 117.5-118.1'	R17: 7 minutes
-	121.5			-	Ė	except extremely weak (R0) 119.5-119.7' - Same as 117.5-118.1' No Recovery 119.7-121.5'	N77. 7 minutes
-			3	121.7' - Fracture, horizontal, rough,undulating, open		Limestone 121.5-124.4' - very pale orange	
-			4	122.35' - Fracture, horizontal, rough, undulating, open	Ħ	<ul> <li>mottled with medium light gray, (10YR 8/2 with N6), fine grained, mild HCl reaction, weak (R2), 10%</li> </ul>	
-	R18-NQ		0	122.4' - Mechanical break 122.85' - Fracture, horizontal, rough, - undulating, open		<ul> <li>coverage of voids up to 3/16" at 121.5-122.5', 10% fossil casts (up to</li> </ul>	
105	5 ft 58%	17		123.0-123.1' - Fracture, 60 deg, rough, undulating, 1/8" open	H	3/16"x3/8") at 123.7-123.9'  No Recovery 124.4-126.5'	
125_ -83.6			NR	123.1-123.2' - Fracture, 70 deg, rough, undulating, open 123.3' - Fracture, 60 deg, rough, undulating, -	Ė	<del></del> -	
-	126.5			open 123.6' - Mechanical break	Ħ	-	R18: 9 minutes Total Depth of boring
_				124.0' - Mechanical break		Bottom of Boring at 126.5 ft bgs on - 11/14/2007	126.5'
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722823.9 N, 456814.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 3.5 ft b	gs on 11/2	27/07	START : 11/16/2007 END : 11/27/2007 LOGGER : P. De Sa'rego, T. Borton
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		RECOVE	ERY (ft)	12011120210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
				(N)	
42.0	0.0			1-1-2	Poorly Graded Sand With Organics (SP) 0.0-1.4' - moist, very loose, brownish gray (5YR 8/1)
_		1.4	SS-1	(3)	from 0.0-0.5', very light gray (N5) from 0.5-1.4', fine
_	1.5				silica sand, trace nonplastic fines, 20% roots/organic matter over 0.0-0.5'
_					
_					
_					
_					
_					
_					
5	5.0				
37.0				2-1-1	Poorly Graded Sand With Silt (SP-SM) 5.0-5.8' - grayish orange, (10YR 7/4), wet, very loose,
-		0.8	SS-2	(2)	no HCl reaction, fine silica sand, 5-10% nonplastic
_	6.5				\fines / _
-					<b>.</b>
_					<b>.</b>
_					<b>.</b>
_					<b> </b>
-					
_					
10	10.0				
32.0				8-3-6	Limestone Fragments With Silty Sand  10.0-11.3' - very pale orange, (10YR 7/4), silty sand is
_		1.3	SS-3	(9)	wet, loose, moderate HCl reaction, fine to coarse
_	11.5				sand-sized, 35-40% low plastic fines, all carbonate,
_					\30% silty sand
_					<b>.</b>
-					<b>.</b> .
-					
-					
-					
15	15.0				City Cond (ON)
27.0				2-2-2	Silty Sand (SM) 15.0-16.0' - yellowish gray, (5Y 8/1), wet, very loose, Driller's Remark: 10:08 water level at 3.5'
-		1.0	SS-4	(4)	strong HCl reaction, 20% fines, fine to coarse
_	16.5				\sand-sized grains, all carbonate materials including \rightarrow one limestone fragment (1") subrounded to \rightarrow -
-					subangular
-					
-					
-					
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-					
20					
L			l		



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722823.9 N, 456814.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

DRILLIN	G METH	OD AND	EQUIPMI	ENT : CME 45B S	6/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 3.5 ft bo	gs on 11/2	27/07	START: 11/16/2007 END: 11/27/2007 LOGGER: P. De Sa'rego, T. Borton
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
표성인		RECOVE	ERY (ft)	TEOTTIEGGETG	SOIL NAME, USCS GROUP SYMBOL, COLOR,  SOIL NAME, USCS GROUP SYMBOL, COLOR,  DEPTH OF CASING, DRILLING RATE,  DEPTH OF CASING, DRILLING RATE,
T A L			#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR OF DRILLING FLUID LOSS, TESTS, AND SONSISTENCY, SOIL STRUCTURE, MINERALOGY SOIL STRUCTURE, MINERALOGY
SCH			#1111	(N)	$\left[\begin{array}{c} \Sigma \end{array}\right]$
22.0	20.0				Sandy Clay (CH) Tricone bit (3-7/8")
_	1	1.4	SS-5	2-3-50/5.5	20.0-20.85' - transitions from light bluish gray to light - SS-5A from 20.0-20.85' - gray, (5B 7/1 to N7), moist, medium stiff, medium to SS-5B from 20.85-21.35'
-	21.5			(53/11.5)	│ \ high plasticity, moderate HCl reaction, 20-25% very │
-	21.5				fine to fine silica sand
-	1				Silt (ML)   - 20.85-21.35' - grayish yellow, (5Y 8/4), moist, hard,   -
-	-				\nonplastic. rapid dilatancy, mild HCl reaction, trace
-					fine to medium sand-sized grains, carbonate
-					
-					
_					_
25	25.0				
17.0				0.45.04	Sandy Lean Clay (CL)  SS-6A from 25.0-25.4'  SS-6B from 25.4-26.45'  SS-6B from 25.4-26.45'
		1.5	SS-6	2-15-31 (46)	\ vellow. (5B 7/1 and 5Y 8/4), wet. stiff, medium \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
1 -	26.5			(10)	plasticity, slow dilatancy, mild to moderate HCl
-					reaction in grayish yellow areas, 20% very fine to fine / =
_	1				Silt (ML)
_					\ 25.4-26.45' - grayish yellow, (5Y 8/4), moist, hard,   -
-					fine to medium sand-sized grains, all carbonate
-	1				materials -
-					
-	-				
30 12.0	30.0				Silty Sand (SM)
-				7-12-22	30.0-31.0' - grayish yellow, (5Y 8/4), moist, dense,
_		1.0	SS-7	(34)	mild HCl reaction, fine to coarse sand-sized, 30-35%
_	31.5				\fragments, all carbonate materials
_					
	]				] ]
l _					
					1 1
-	1				<b>1</b>
35	35.0				<b> </b>
7.0	33.0	0.7	00.0	18-50/3	Sandy Silt (ML)
-	35.8	0.7	SS-8	(68/9")	35.0-35.7' - Same as 30.0-31.0' except nonplastic, -
-					Tapid dilatarity, 35-40% line to coarse sand-sized
-	-				
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722823.9 N, 456814.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 3.5 ft bo	gs on 11/2	27/07	START : 11/16/2007 END : 11/27/2007 LOG	GGEF	} : P	De Sa'rego, T. Borton
>				STANDARD	SOIL DESCRIPTION		ā	COMMENTS
AND AND	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISSS SPOLID SYMBOL COLOR		SYMBOLIC LOG	DEDTH OF CASING DRILLING DATE
H BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTATION
2.0	40.0				Sandy Silt (ML)		Ш	
-		1.4	SS-9	19-26-50/5 (76/11)	40.0-41.4' - grayish yellow, (5Y 8/4), moist, hard, nonplastic, rapid dilatancy, mild HCl reaction, 40-45	%		_
	41.4				fine to coarse sand-sized, 5% fine gravel-sized limestone fragments, carbonate materials	_ /=	Ш	_
l _					intestorie ragments, carbonate materials	_/ _		_
-						_		_
-	-					-		-
-	_					-		-
-						-		-
45	45.0					-	l	Driller's Remark: Hard at 44.5'
-3.0	45.0	0.0	SS-10	50/0.5 (50/0.5")	Limestone Fragments 45.0-45.05' - about ten limestone fragments (<1/4")	T		Switch to rock coring at 45.0'
-	•			(50/0.5)	\recovered	_/ -		-
-					Begin Rock Coring at 45.0 ft bgs See the next sheet for the rock core log			-
					See the flext sheet for the rock core log			]
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-						_		_
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50 -8.0	-					_	l	_
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PROJECT NUMBER:

33884.FL

BORING NUMBER:

CT-07

SHEET 4 OF 5

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722823.9 N, 456814.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, NQ tools, NW casing

				IENT : CIVIE 43B 3/N 331374, ITIUU TOLATY, NQ 1001S, NVV			ORIENTATION . Vertical
WATER	LEVELS : 3.5	ft bg	s on 1		/27/2		
ŞQ⊋	<u>(%</u>			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
AGE	JS. F. A.	(%) <sub>Q</sub>	128	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	딩	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
무류짓	DARE COURT	O	AAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	l B	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
		œ	H H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	်	CHARACTERISTICS	·
-3.0	45.0 R1-NQ		0		Н	<b>Limestone</b> - 45.0-46.0' - light olive gray, (5Y 4/4),	13:45 Begin rock coring
	1.5 ft	67	"		ш	fine to medium grained, moderate	R1: 7 minutes
-	67%   46.5		NR		╁	HCl reaction, weak (R2), fossiliferous	_
-	40.5			46.55' - Fracture, <5 deg, rough, undulating,	Ė	<ul> <li>(10-20%) casts and molds, voids up to 1/8" (predominantly &lt;1/16") over</li> </ul>	_
-			3	open 1/8"	╁	5-15% of surface, one void at 45.2'	-
-				46.8' - Fracture, 10-15 deg, rough, undulating, tight	$\Box$	- (1"x1/8")	-
-			2	47.4' - Fracture, 0-10 deg, rough, undulating,	+	No Recovery 46.0-46.5' Limestone	_
-				open 1/2" with fragments up to 1/2",	╆┯	46.5-49.25' - light olive gray with	_
l _	R2-NQ 5 ft	55	1	subrounded to subangular 48.1' - Bedding plane or mechanical break,		zones of yellowish gray from	_
l _	55%			<5 deg, rough, undulating, open <1/16"	╨	47.25-47.4' and from 48.9-49.4', (5Y 5/2 with 5Y 8/4), fine to coarse	
50				48.25' - Mechanical break, <5 deg, rough,	Ш	grained, mild to moderate HCl	R2: 7 minutes
-8.0			NR	undulating, tight — 49.1' - Bedding plane, <5 deg, rough, planar,	$\vdash$	reaction, weak to medium strong (R2 to R3), voids (<1/16") over 10-20% of	
-			INIX	tight	H	core, moderately fossiliferous (casts	1
-	54.5				╁	and molds)	-
-	51.5				╙	No Recovery 49.25-56.5'	Driller's Remark: 51.5-56.5'
-					仜	<u>}</u>	soft -
-					╁┯	+	Started to get soft at 50.0'
_						1	_
_					₽	_	_
l _	R3-NQ 5 ft	0	NR		Ш	]	_
l _	0%	Ü	'''		ш	1	_
55					Н	1	
-13.0					Ľ	Γ	
-					╁	Ī	R3: 2 minutes
_	56.5				$\vdash$	Ī	_
-	00.0				ш	Limestone	1
-			1		╁	- 56.5-58.1' - yellowish gray to grayish	-
-				57.3, 57.7' - Mechanical break or bedding		yellow, (5Y 7/2 to 5Y8/4), fine to medium grained, mild to moderate	-
-			2	plane (2), <5 deg, rough, undulating, tight		HCl reaction, extremely weak to	-
-	DANO			58.1' - Bedding plane, <5 deg, rough, undulating to planar, tight	-	weak (R0 to R2), highly fossiliferous (90% casts and molds <1/16"-3/16"),	-
-	R4-NQ 5 ft	32	1		Ш	voids (<1/16") over 20-30% of	-
-	72%				_	surface	_
60			0	_	717	Sand With Silt (SM) 58.1-59.0' - yellowish gray to grayish	
-18.0					F	_ vellow, (5Y 7/2 to 5Y8/4), fine to	
1			NR		Ë	coarse grained, nonplastic, mild HCI reaction	R4: 4 minutes
1	61.5				$\vdash$	No Description 59.0-59.6'	]
1 -					Ш	Sand With Silt (SM)	1
1 -			3	61.95, 62.1' - Bedding plane (2), <5 deg,	<b>1</b> Щ	59.6-59.8' - Same as 58.1-59.0'	_
1 -				rough, planar, tight 62.5' - Fracture or mechanical break, 70-80	Ľ	Limestone   59.8-60.1' - Same as 56.5-58.1'	
1 -			2	deg, rough, undulating, tight		except very weak (R1)	-
1 -	R5-NQ			62.6' - Same as 62.5' except opposite	Ш	No Recovery 60.1-61.5'	-
-	5 ft	18	1	direction of angles 63.3' - Bedding plane, <5 deg, rough, planar,	₩	Sandy Silt (ML) 61.5-62.2' - yellowish gray, (5Y 7/2),	=
1 -	94%			tight	Ħ	moist, nonplastic, mild HCl reaction	-
65					$\vdash$		
1					1		
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PROJECT NUMBER:

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CT-07

SHEET 5 OF 5

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722823.9 N, 456814.3 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, NQ tools, NW casing

				MENT . CIVIE 43B 3/N 331374, Midd Totally, NQ tools, NVV C			
WATER	LEVELS: 3.5	ft bg	s on 1		27/2		
> 0 0	[ ; l			DISCONTINUITIES	ڻ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		SI	DESCRIPTION	FOG	ROCK TYPE, COLOR,	
ᆱ႘ᆮ	₹,# 	(%	URE		임	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F A Y	954 200	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
		S. O	FR/PEF	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-23.0			3	64.3' - Mechanical break or bedding plane,		Limestone	
	-			<5 deg, rough, undulating, open 1/2"		- 62.2-63.3' - yellowish gray, (5Y 7/2),	-
l _			0	64.8' - Mechanical break, 70-80 deg, rough,	ш	fine to medium grained, mild HCl	R5: 9 minutes
	66.5		NR	undulating, tight	П	reaction, very weak (R1),	
-	00.0		····	65.0' - Bedding plane or mechanical break, – <5 deg, rough, undulating, tight		- fossiliferous (casts and molds), voids (up to <1/16") over 5-10% of surface	-
-	-		2	65.5' - Mechanical break or bedding plane,	Н	Sandy Silt (ML)	-
_	-			<5 deg, rough, undulating, tight –		- 63.3-64.0' - Same as 61.5-62.2'	-
_	_		3	66.7' - Mechanical break or bedding plane,	Н	Limestone	_
				<5 deg, rough, undulating, tight		64.0-66.2' - Same as 62.2-63.3'	
_	R6-NQ			67.15' - Mechanical break or bedding plane, – <5 deg, rough, planar, tight		except transitions from extremely	_
-	5 ft	57	1	67.8' - Bedding plane, <5 deg, rough,	Н	ueak to very weak (R0 to R1) at 64.3'	=
_	96%			undulating, tight		No Recovery 66.2-66.5'	-
70	<u> </u>		1	68.0' - Mechanical break or bedding plane,	Н	Limestone	
-28.0				<5 deg, rough, undulating, tight 68.15' - Fracture, 5-10 deg, rough,	Ш	66.5-71.3' - yellowish gray, (5Y 7/2),	
	1		_	undulating, tight		fine to medium grained, mild HCl	R6: 8 minutes
1 -			1	69.3, 70.2 - Bedding plane (2), <5 deg,	Н	reaction, very weak (R1) with zones of weak (R2) rock from 67.1-67.6'.	-
-	71.5		NR.	rough, planar, tight		- 68.1-69.25', and 70.35-71.3', variable	_
_			0	70.8' - Fracture, 20-30 deg, rough, undulating, tight	Н	voids (<1/16"-3/16") over 10-20% of	_
				dilddiatilig, tigrit		surface, fossiliferous casts and	
					Ш	<ul><li>molds (10-15%), trace organics</li><li>No Recovery 71.3-71.5'</li></ul>	
-	1		1	72.95' - Bedding plane, <5 deg, rough,	Н	Limestone	-
-	R7-NQ			undulating, tight –		<ul> <li>71.5-76.25' - yellowish gray to</li> </ul>	_
_	5 ft	68	>10	73.75-73.95' - Fracture zone, one large	Ш	grayish yellow, (5Y 7/2 to 5Y 8/4),	_
l _	95%			fragment 2-1/2" with small fragments <3/4",	П	very fine to medium grained, mild  HCl reaction, very weak (R1), voids	
75				subrounded to subangular 74.15' - Bedding plane, <5 deg, rough,	$\vdash$	(up to <1/16") over 5-10% of surface,	
-33.0	1		1	undulating, tight		fossiliferous (casts and molds) <5%,	_
-	1			74.4' - Bedding plane or mechanical break,		extremely weak (R0) from 72.5-73.1'	R7: 11 minutes
_	-		2	<5 deg, rough, undulating, tight _		with a trace of fines	_
_	76.5		NR	75.15 - Bedding plane or mechanical break,		No Recovery 76.25-76.5'	Total depth is 76.5'
				75.5-75.6' - Fracture, <5 deg, rough,		Bottom of Boring at 76.5 ft bgs on	
_	1			undulating, open 1.0" with one large fragment		11/27/2007	_
-	-			√75.95' - Mechanical break or bedding plane,		-	-
1 -				<5 deg, rough, undulating, open <1/16"		_	-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-08	SHEET	1	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722706.4 N, 457111.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

					5/N 351574, mud rotary, auto naminer, AWJ rous, 3-7/6 tir-corie bit ORIENTATION : Vertical
WATER	LEVELS	: 5.0 ft bo	gs on 11/	16/07	START : 11/15/2007 END : 11/15/2007 LOGGER : T. Borton, P. De Sa'rego
>00				STANDARD	SOIL DESCRIPTION COMMENTS
N A N	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME LIGGS OPOUR OVARDOL COLOR
		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
<u> </u>				(N)	
42.2	0.0			122	Topsoil   Begin drilling 11/15/07, 09:00   O.0-0.1' - dark gray to grayish black, (N3 to N2)
l _	[	1.1	SS-1	1-2-2 (4)	Poorly Graded Sand With Organics (SP)
	1.5			. ,	↑ 0.1-1.1' - dark gray to medium light gray with depth,
					\(\text{(N3 to N6), moist, very loose, very fine to fine grained, \) \(\frac{1}{25\%}\) organics, rootlets decreasing with depth, sand is \(\frac{1}{2}\)
	1				silica
_					1
-	1				†
-	1				<u> </u>
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5 37.2	5.0				Silty Sand (SM)
- 37.2				2-2-3	5.0-6.1' - light olive brown, with <5% very light gray
_		1.1	SS-2	(5)	mottling throughout, (5Y 5/6 with N8), moist to wet,
I _	6.5				very loose, fine grained, no HCl reaction, 19% medium plasticity fines, trace iron concretions, sand is / -
l _					silica
					]
-	1				1
-					1
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10 <u> </u>	10.0				Silt (ML)
-		10	000	4-6-14	10.0-11.0' - grayish yellow, (5Y 8/4), wet, very stiff,
-		1.0	SS-3	(20)	nonplastic, rapid dilatancy, mild to moderate HCl reaction, 10-15% very fine to medium sand-sized, all
-	11.5				carbonate material
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15	15.0				1
27.2	15.4	0.4	SS-4	50/5	Silt (ML)
-				(50/5")	15.0-15.42' - yellowish gray, (5Y 8/1), moist, hard, nonplastic, rapid dilatancy, mild to moderate HCl
-	1				reaction, 4% very fine to medium sand-sized, all
-					carbonate material -
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722706.4 N, 457111.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 5.0 ft bo	gs on 11/1	16/07	START : 11/15/2007 END : 11/15/2007 LOG	GER	: T.	Borton, P. De Sa'rego
300				STANDARD	SOIL DESCRIPTION		90	COMMENTS
ANC (#	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		OTO	DEPTH OF CASING, DRILLING RATE,
H BE ATIC		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
22.2	20.0				Silt (ML)		Ш	09:44 Installing casing to 20.0'
-		1.3	SS-5	26-33-50/4 (83/10")	20.0-21.25' - Same as 15.0-15.42' except grayish yellow to yellowish gray, (5Y 8/4 to 5Y 8/1)	-		-
_	21.3			(00.10)	yenen te yenemen g.ay, (e r er r te e r er r)		Ш	-
-								_
_						_		_
_						_		_
_						_		_
_						_		-
25 <u> </u>	25.0			24-50/1.5	Silt With Sand (ML)			
- 17.2	25.6	0.4	SS-6	(74/7.5")	25.0-25.4' - grayish yellow to yellowish gray, (5Y 8/4 f	to /=	Ш	-
-					5Y 8/1), moist, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 17% fine sand-sized grains,	-		-
-					all carbonate materials	_] -		-
-						-		-
-						-		-
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-						-		-
-						-		-
30	30.0					-		-
12.2					Sandy Silt (ML)		Ш	
		1.5	SS-7	17-34-51 (85)	30.0-31.5' - dark yellowish orange, (10YR 6/6), moist hard, nonplastic, rapid dilatancy, moderate HCl	, _		
	31.5			()	reaction, 35% fine to coarse sand-sized, trace fine gravel-sized limestone fragments, moderate to strong	٦ ,	Ш	_
l _					HCl reaction in fragments, all carbonate materials			_
_						_		_
-						_		-
-						_		-
-						-		Driller's Remark: Hard drilling at 34.0';
-						-		alternating hard/soft zones similar to -
35 7.2	35.0 35.3	0.0	SS-8	50/3	No Recovery 35.0-35.3'			elsewhere on site
-		<u> </u>		50/3 (50/3")	No Recovery 35.0-35.3' few limestone fragments <1/4", subangular, moderate	e /-		-
-					to strong HCl reaction	_/ -		-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	CT-08	SHEET	3	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722706.4 N, 457111.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

		: 5.0 ft bo		16/07	START : 11/15/2007 END : 11/15/2007 LOGGER : T. Borton, P. De Sa'rego
					SOIL DESCRIPTION COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS	0070
ACE TIOI		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
<u> 2.2</u>	40.0			(11)	Sandy Silt (ML)
-		1.2	SS-9	23-29-50	40.0-41.2' - yellowish gray to light olive gray, (5Y 7/2
-		'		(79)	⊢ reaction, 39% fine to coarse grained sand, 6% gravel, ┌┩┼┼┼ Stop SPT sampling at 41.5'
-					trace of gravel-sized limestone fragments, wavy laminar bedding (grayish yellow [5Y 8/4]), all
-					\carbonate materials \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-					Begin Rock Coring at 41.5 ft bgs See the next sheet for the rock core log
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PROJECT NUMBER:

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BORING NUMBER:

CT-08

SHEET 4 OF 4

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722706.4 N, 457111.8 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

WATER	LEVELS : 5.0	ft bas	s on 1	1/16/07 START : 11/15/2007 END : 11.	/15/2	007 LOGGER : T. Borton, P. De Sa're	ego
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_	41.5		0	-		Limestone - 41.5-45.6' - pale yellowish brown,	Begin rock coring at 41.5'
-			1	-	Ħ	(10YR 6/2), fine grained, mild HCI reaction, weak to medium strong (R2 to R3), very weak (R1) at 45.1-45.6',	-
-	R1-NQ	68	1	43.05' - Fracture or mechanical break, horizontal, rough, undulating, <1/8" open		trace voids up to 1/16", a 3/8"x3/8" cavity is at 43.3' and a 2"x1-3/16" cavity is at 44.9'	_
45	5 ft 82%	00		43.9' - Fracture, 30 deg, rough, undulating, black staining over 100% of surface, open		- Cavity is at 44.9	_
-2.8			2	45.1-45.2' - Fracture, 45 deg, rough, undulating, 1/8" open			R1: 40 minutes
-	46.5		NR	45.4' - Fracture, 30 deg, rough, undulating, - 1/8" open		Limestone	-
-			3	46.6' - Fracture, 10 deg, rough, undulating, open - 47.05' - Fracture, 30 deg, rough, undulating, -		<ul> <li>46.5-51.0' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl</li> </ul>	
-			>10	1/8" open 47.2' - Fracture, 30 deg, 1/8" open, fine gravel-sized fragments		reaction, weak (R2), becoming very weak to weak rock at 49.8-51.5', trace voids up to 3/16" throughout	-
_	R2-NQ 5 ft 90%	58	0	47.55' - Fracture, 10 deg, rough, undulating, tight 47.55-47.95' - Fracture, vertical, rough,		run, 15% voids to 1/8" from 49.4-49.8', 10% cavities up to 1"x3/8" from 49.4-49.8'	_
50_ -7.8			2	undulating, 1/8" open 47.95-48.35' - Fracture zone, fine	H	- · · · · · · · · · · · · · · · · · · ·	_
-			0	gravel-sized fragments  49.8' - Fracture or mechanical break, horizontal, rough, undulating, tight		- No Recovery 51.0-51.5'	R2: 12 minutes Total depth of boring 51.5',
-	51.5		NR	50.5' - Mechanical break		Bottom of Boring at 51.5 ft bgs on 11/15/2007	on 11/15/07 at 16:00 - Recovery and RQD criteria
-				- -		-	11/16/07 at 08:15, water level is 5.0' below ground
-				-		-	surface
_				-		-	-
-				-		<del>-</del> -	
-				- -		-	- -
-				-		-	-
-				-		- -	_
-				-		-	-
-				_		<u></u>	_
-				-		-	_
-							



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	D-01	SHEET	1	OF 6	;

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724095.5 N, 457510.2 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6" tri-cone bit ORIENTATION : Vertical

DRILLIN	G METH	<u>od and</u>	EQUIPM	ENT : Dietrich D-5	0 S/N 232, mud rotary, cathead, NWJ rods, 6" tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 3.0 ft b	gs on 5/2	2/07	START : 5/22/2007 END : 5/23/2007 LOGGER : R. Bitely
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	AL (ft)	PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
ON A		RECOVI		TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,
ATI ATI		I DECOVI			MOISTURE CONTENT, RELATIVE DENSITY OR ON DRILLING FLUID LOSS, TESTS, AND
E.E.E.E			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
40.8	0.0			(11)	Poorly Graded Sand W/ Organics (SP)  Boring offset 11.5' SE of staked location due
-	0.0			1-1-3	一、0.0-0.55' - very light gray to dark yellowish brown, (N8 /
_		0.8	SS-1	(4)	to 10 fR 4/2), moist, very loose, very line to line
_	1.5				\\grained, 10% organic matter, less with depth, trace \\\\\\\nonplastic fines, silica sand
					Silty Sand (SM)
					0.55-0.85' - dark yellowish orange, (10YR 6/6), moist,
_					very loose, very fine grained, less than 20% fines, 5% organics, silica sand
_					Rapid, easy drilling. Water encountered at
_					- ☐ 3.0' below ground surface. Wood at 3.0' in
_					_ mud pit.
_				[	<b>.</b>
5	5.0				
35.8				[ <u> </u>	Sand (SP) 5.0-5.8' - very light gray, (N8), wet, medium, very fine
_		0.8	SS-2	5-8-8 (16)	¬ grained, trace nonplastic fines, trace very fine grained / ¬
_	6.5			(16)	black particles
-	0.0				11
_					
_					<b>-                                    </b>
_					<b></b>
_					11
_					<b>†  </b>
-					
10 30.8	10.0				Clayey Sand (SC)
				5-6-7	10.0-11.2' - yellowish gray, (5Y 7/2), wet, medium,
_		1.2	SS-3	(13)	very fine to fine grained, 30% moderate plastic fines,
	11.5			` ,	silica sand
					<b>1</b>
-					†
_					<b>-  </b>
-				[	
_					
_				[	] ]
15	15.0			<u> </u>	
25.8					Clayey Sand (SC)
_		1.2	SS-4	8-8-10	15.0-16.2' - Same as 10.0-11.2' except 4" sandy clay lens (CH) at 15.6-15.9', moderate plasticity
-	10.5			(18)	ions (ori) at 10.0-10.9, inductate plasticity
_	16.5			<del> </del>	-
_				[	
_					<b>.</b> .
_				[	<b>] ]</b>
_					11
_					11
-				[	1 1
20		-	-	<u> </u>	
				[	
	I	1	1	I	<b>     </b>



PROJECT NUMBER:	BORING NUMBER:				
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724095.5 N, 457510.2 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 3.0 ft b	gs on 5/22	2/07 5	START : 5/22/2007 END : 5/23/2007 LOGGER : R. Bitely
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		RECOVE	ERY (ft)	12011120210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
HT4			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
20.8	00.0			(N)	
20.6	20.0			4-4-5	Clayey Sand (SC)  Clayey Sand (SC)  Rapid, easy drilling. SS-5 is less plastic than SS-3 and SS-4
-		0.4	SS-5	(9)	very fine to fine grained, 40% low to moderate plasticity fines, silica sand
-	21.5				Plasticity files, sinca sand
-					
-					-
-					-
-					-
-					-
					-
25 <u> </u>	25.0				Silty Sand (SM)
-		1.3	SS-6	5-5-6	25.0-26.3' - Same as 20.0-20.45' except 25-30% low
-	26.5	1.0		(11)	plastic finesiii
-	20.5				1 1
-					1
-					1
-					1
-					1
-					1
30	30.0				
10.8				0.4.4	Silty Sand (SM) 30.0-31.2' - Same as 25.0-26.3' except 40-45%
l _		1.2	SS-7	3-4-4 (8)	nonplastic to low plastic fines
_	31.5			, ,	<u> </u>
_					_
_					
-					-
-					1 1
-					1 1
					1 1
35 5.8	35.0				Organic Soil With Sand (OH)
-		0.4	SS-8	5-3-4	□ 35.0-35.2' - gravish black, (N2), moist, firm, high
-	20.5	0.4	00-0	(7)	\  \plasticity, slow dilatancy, 20% very fine to fine silica \  \sand, trace limestone rounded pebbles \  \  \
-	36.5				Silty Sand (SM)
-					35.2-35.4' - light olive gray, (5Y 6/1), wet, loose, very fine to fine grained, 30% low plastic fines, silica sand,
-					<1/2" thick organic clay (OH) seam at 35.35'
-					1
-					1
					1
40					



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724095.5 N, 457510.2 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6" tri-cone bit ORIENTATION : Vertical

						END : 5/22/2007		э · р	ONIENTATION : Vertical
WATER	LEVELS	: 3.0 ft bo	IS UH 5/22		START : 5/22/2007	END: 5/23/2007 SOIL DESCRIPTION	LOGGE	T : K.	COMMENTS
≩Q≆ I	CAMPIE	INTERVA	I /ft\	STANDARD PENETRATION		SOIL DESORIF HON		98	OCIVIIVILINIO
ON (	SAIVIPLE			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,				DEPTH OF CASING, DRILLING RATE,
H B		RECOVE	. ,		MOISTURE (	CONTENT, RELATIVE DEN	ISITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENC	CY, SOIL STRUCTURE, MIN	IERALOGY	SYMBOLIC LOG	INSTRUMENTATION
0.8	40.0			(14)	Silt With Sand (	(ML)		╫	Hard, slow drilling. No chatter.
-		0.9	SS-9	48-48-50/4	40.0-40.9' - olive	è gray, (5Y 3/2), moist, ha	ırd, low	$\  \ $	
-	41.3			(100)		dilatancy, moderate HCl re edium-sized limestone fra		╂‴	1 -
-					trace fine gravel		<b>g</b> ,	-	-
-								-	-
-								-	-
_								-	-
_								-	-
-								4	-
-								1	
45 -4.2	45.0				0 1 0:1: (141)			<b> </b>	
-4.2	45.0	0.7	SS-10	50-50/3 (100")	Sandy Silt (ML) 45.0-45.65' - oliv	) ve gray, (5Y 3/2), moist, h	ard, low to	4	
_	45.8			(100)	moderate plastic	city, rapid dilatancy, mode	erate HCI	Г	] _
_					reaction, 25-30%	% fine sand-sized limestor	ne fragments/	1	
_								1	
_									
									<u> </u>
									Very light, intermittent chatter.
_									_
50	50.0								
-9.2	F0.7	0.5	SS-11	48-50/2		<b>Limestone Lenses (ML)</b> e gray, (5Y 3/2), wet, hard	Llowto		
	50.7			(100")	\ moderate plastic	city, moderate HCI reaction	n, <30%		]
					limestone lenses	s, 35% fine to coarse san	d-sized		
					limestone magni	ients			1
									1
								1	1
									1
-								1	1
-								1	1
55	55.0							1	1
-14.2	55.0			48-50/5.5	Silt With Sand (	(ML)		<b>†</b> Ⅲ	1 7
-	56.0	0.8	SS-12	(100")	55.0-55.8' - light	t olive gray, (5Y 5/2), mois city, rapid dilatancy, mode	st to wet,	Ш	] 1
-	55.0				reaction, 20% fir	ne to medium sand sized,	, 40%	1	1
-					∖organics as sea⊩ ∖(N1)	ms <1/4" thick and lamina	ations, black	1	100% circulation loss. Removed NWJ rod
-					(()			1	and 6" tri-cone, set HW casing to 59.0' below - ground surface. Regain 100% circulation at
-	60.0							1	57.5' below ground surface with HW casing.
-	60.1	0.1	SS-13	50/1.5	\triangle Limestone Frag		Γ	╆	Stop drilling at 17:30 5/22/07 after setting the casing
-				(50/1.5")	60.0-60.1' - light	t olive gray, (5Y 5/2), mod ents <1" diameter, voids <	lerate HCl	1	-
-					40% of surface	onio < 1 diambito, volus <	. 1/ 10 0001	1	1
60								1	
60					Begin Rock Cori	ing at 60.0 ft bgs		+	-
					See the next she	eet for the rock core log		L	
					OCC THE HEXT SHE	eet for the rock core log			



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PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724095.5 N, 457510.2 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 3.0	ft bg	s on 5/	/22/07 START : 5/22/2007 END : 5/	23/20	007 LOGGER : R. Bitely		
≥O≎	(%			DISCONTINUITIES	၂	LITHOLOGY	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,	
H BE	E RU STH, OVEF	(%) Q	F.05	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30L	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND	
EPT CURF	SORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.	
	60.0 R1-NQ	ď		, , , , , , , , , , , , , , , , , , ,	S		Continue drilling at 0800	
-	1 ft	40	0	-	L	Limestone 60.0-60.4' - yellowish gray, (5Y 7/2),	5/23/07, water level at 2.2' -	
-	61.0 40%		NR		₽	fine grained, weak to moderate HCl	below ground surface. Clean out HW casing to	
-			>10	61.1, 61.3' - Fracture or mechanical break, <10 deg, rough, undulating, open <1/2"	П	reaction, weak (R2), voids 1/16" over 50% of surface, poorly fossiliferous,	59.0' below ground -	
_				61.4, 61.65, 61.7, 61.75, 61.8, 61.85' -	世	_ few cavities <1/4" diameter	surface, tri-cone with 3-7/8" bit to 60.0'	
-			0	Fractures or mechanical break, 30 deg and 40 deg, rough, undulating, tight, open <1/4"	┢	No Recovery 60.4-61.0' Limestone	Light Chatter –	
-	50.110			61.9' - Fractures or mechanical break,	H	61.0-62.4' - yellowish gray, (5Y 7/2),	Remove AWT rod and 3- 7/8" tri-cone	
_	R2-NQ 5 ft	9		horizontal, rough, undulating, tight, open <1/4"	Ľ	fine grained, moderate HCl reaction, weak to medium strong (R2 to R3),	Set NQ tooling to 60.0'	
_	28%			62.2' - Mechanical break	₽	voids <1/16" over 20-30% of surface,	Advance HW casing to seat in top of rock at 60.0'	
_			NR	<u>-</u>	dash	trace cavities <1/4" diameter, poorly fossiliferous, trace organics, trace	R1: 25 seconds	
65				<del></del>	П	silts at 62.4', possible soil zone at		
-24. <del>2</del>				<u>-</u>	口	62.4-66' No Recovery 62.4-66.0'	R2: 7 minutes	
_	66.0			<u>-</u>	⊣	<u> </u>	_	
_			4	66.35' - Mechanical break or fracture, 60 deg,	F	Limestone 66.0-67.7' - yellowish gray, (5Y 7/2),	_	
_			·	rough, undulating, tight, open <1/4"		fine grained, moderate HCl reaction,		
_			0	66.45' - Mechanical break or fracture, vertical, rough, undulating, tight	H	weak to medium strong (R2 to R3), voids <1/16" over 30-40% of surface,	_	
l _			NA,	66.6' - Fracture or mechanical break, 50 deg,	Ш	many cavities <1/4" diameter,	Driller's Remark: 100%	
_	R3-NQ 5 ft	25		rough, undulating, open <1/4" 66.95' - Fracture or mechanical break,	<b>.</b>	moderately fossiliferous with molds / <1/4" diameter	circulation loss at 68.0'	
l _	67%		NR	horizontal, rough, undulating, open <1/4"	]	Silt And Limestone Interbeds (ML)		
l _				67.7-69.6' - poorly indurated silts and limestone fragments (8")	]	67.7-70.45' - yellowish gray, (5Y 7/2), hard, fine to medium grained, strong	_	
70			1	• , ,	<b>]</b>	HCl reaction, very weak (R1),		
-29.2			NA	69.9' - Fracture or mechanical break, 80 deg, rough, undulating, tight	Щ	limestone interbeds are 1" thick, partial no recovery in interval	R3: 5 minutes	
_	71.0		NR	70.45-71.0' - poorly to moderately indurated	]	Carbonate Silt (ML)		
_				silt (1")	]	70.45-71.0' - yellowish gray, (5Y 7/2),	]	
l _						hard, moderate to strong HCl reaction, friable		
			NR			No Recovery 71.0-73.6'		
	R4-NQ	34						
	5 ft 48%	34	3	73.85' - Bedding plane (3), horizontal,	╚	Limestone	1	
			4	smooth, undulating, tight, 3+ bedding plane fractures in indurated silts/extremely weak	Ш	73.6-73.85' - yellowish gray, (5Y 7/2), very fine to fine grained, extremely	1	
75_			4	limestone	$\vdash$	weak (R0), laminated	1	
-34.2			_	74.9-75.05' - Fractures or mechanical break (4), rough, undulating, intersecting angles	Ė	73.85-76.0' - yellowish gray, (5Y 7/2), moderate HCl reaction, strong to	R4: 3 minutes	
	76.0		3	75.7-75.8' - Fractures or mechanical break	片	medium strong (R4 to R3), voids	1	
				(3), 50 deg, rough, undulating, tight, 3	H	<1/16" over 30-40% of surface, few cavities <1/2" diameter, poorly	1	
_			>10	intersecting fractures 76.0-76.15' - Fracture zone, rough,	oxdot	fossiliferous	1	
-				undulating, gravel sized fragments <1"	口	76.0-78.0' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction,	1	
-			>10	diameter 76.45' - Fractures or mechanical break (2),	┢	medium strong to strong (R3 to R4),	1	
-	R5-NQ			45 deg, rough, undulating, tight	$\vdash$	strengthening with depth, voids <1/16" over 30-40% of surface,	1	
-	5 ft 60%	28		76.8' - Fractures or mechanical break (4), 70 deg, rough, undulating, tight, open <1/4"	H	variable, few cavities <1/4" diameter,	1	
-			NR	77.75-78.0' - Fracture zone, rough,	77.75-78.0' - Fracture zone, rough,	, rough, poorly fossiliterous		1
80				undulating, gravel sized fragments <2" diameter		- 1.5 1.555151, 1.5.5-50.0	1	
					Г			
1			1 1		l			



PROJECT NUMBER:	BORING NUMBER:				
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724095.5 N, 457510.2 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 3.0	ft bg	s on 5/	22/07 START : 5/22/2007 END : 5/	23/20	07	LOGGER : R. Bitely	
>∩≎	. (%			DISCONTINUITIES	ပ္ထ	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	; $\Gamma$	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU STH, OVEF	(%) 🛭	ĮŠ.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
LEVER I	SORI	RO	'RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥME		AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-39.2	034	ш.	NA.		<i>"</i>	╁	Fat Clay (CH)	R5: 4 minutes
_			5		F	F	80.0-80.3 - high plasticity, no to slow	-
_	81.0			80.9-81.0' - Fracture zone, rough, undulating,	仜	╊∖	dilatancy, strong HCl reaction, <10%   limestone fragments of medium	-
- -	R6-NQ		>10	gravel sized fragments <1" diameter 81-81.1' - Fracture zone, rough, undulating, gravel sized fragments <1-1/2" diameter 81.45' - Fracture or mechanical break, <10 deg, rough, undulating, 3+ gravel sized fragments <1/2" diameter, open <1/2" 81.75' - Fracture or mechanical break, 40 deg, rough, undulating, open <1/2"		ŀ	sand-sized, calcareous clay	-
			0 grade			ł	Limestone 80.3-81.0' - yellowish gray, (5Y 7/2),	-
_						}	fine grained, strong HCl reaction,	-
_						Ł	extremely weak to very weak (R0 to R1), voids <1/16" over <10-30% of	_
_	5 ft	70	0			Ħ	surface, increasing with depth, no cavities <1/2" diameter, poorly fossiliferous 81.0-83.25' - very light gray to moderate yellowish brown, (N8 to 10YR 5/4), very fine to fine grained.	1 -
_	94%					#1		-
			1			+		-
85 <u> </u>				84.95' - Mechanical break or fracture, <10				R6: 5 minutes
_	00.0		1	deg, rough, undulating, tight 85.15' - Fracture or mechanical break, <10 words <1/16" ov	medium strong to strong (R3 to R4), voids <1/16" over <5-30% of surface,	-		
_	86.0		NR	deg, rough, undulating, open <1/4"	Ħ	1	variable, many cavities <1/2"x1-1/2"	-
_			>10		L	<u>†</u>	diameter, 80% (with secondary recrystallized infill), trace organics,	-
_			>10 de 86 ur di 87	86.8' - Fracture or mechanical break, <10 deg, rough, undulating, open <1/2"	₩	╁	poorly fossiliferous	1
_				86.9-87.05' - Fracture zone, rough, undulating, gravel sized fragments <1-1/2" diameter 87.45, 87.8, 88.05, 89.2' - Fracture or mechanical break, <10 deg, rough, undulating, 1/2" silt lens at 87.8', <1/4" gaps 88.5' - Mechanical break, for hardness test 89.55, 90.0, 90.2, 90.35' - Mechanical break or fractures, <10 deg, rough, undulating,		ł	Carbonate Silt (ML) 83.25-83.35' - very light gray to moderate yellowish brown, (N8 to 10YR 5/4), very fine to fine grained, low to moderate plasticity, rapid to moderate dilatancy, strong HCI reaction  Limestone 83.35-85.7' - very light gray to	-
- - -	R7-NQ 5 ft 92% 91.0					t		1
		50				t		1
						ł		R7: 4 minutes
90			3			1		
-49.2			2			t		
_			NR	fractures through cavities, open <1"	Ľ	t	moderate yellowish brown, (N8 to 10YR 5/4), very fine to fine grained,	-
_	R8-NQ 5 ft 100%			92.35, 92.55' - Mechanical break or fractures, < 10 deg, rough, undulating, tight, open < 1/4"	╁	t	strong HCl reaction, extremely weak to very weak (R0 to R1), strengthening with depth, voids <1/16" over 15-30% of surface, few cavities <1"x1/2" diameter, with partial secondary recrystallized infill, poorly fossiliferous, trace laminated	1
_			0			ł		1
_						t		1
_			0		ш	Ī		-
_					ш			1
		64	1		$\vdash$	t	organics No Recovery 85.7-86.0'	1
					F	Ŧ	Limestone	1
95						Ī	86.0-90.6' - yellowish gray to dark yellowish brown, (5Y 7/2 to 10YR	1
-54.2			,	94.95, 95.05, 95.1, 95.65' - Bedding plane or mechanical break, <10 deg, smooth,	];;	ſ	4/2), 5b 7/1, fine to medium grained, moderate to weak HCl reaction,	R8: 5 minutes
	96.0		3	undulating, tight	H	$\mathbb{I}$	weak to strong (R2 to R4), mottled	
							light bluish gray (5B 7/1) at 86.0-87.8', voids <1/16" over 20-30%	
			<b> </b>				of surface, many cavities, <2"	]
							diameter, poorly to moderately fossiliferous, 1/2" carbonate silt lens	
							at 87.8', trace laminated organics	
_					1		No Recovery 90.6-91.0'	
					1			
_					1			
_					1	Ш		
					<u> </u>	L		1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-01	SHEET	6	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724095.5 N, 457510.2 E (NAD83)

ELEVATION: 40.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

				iEIVI . Dietricii D-30 3/14 232, mad rotary,		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	9		ONENTATION: Vertical
WATER	LEVELS: 3.0	) ft bgs	on 5/	/22/07 START : 5/22/2007	END : 5/2	3/20	07	LOGGER : R. Bitely	
	_			DISCONTINUITIES		(D	1	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION		SYMBOLIC LOG	Г	DOOK TYPE COLOR	
ONA	₹\Z	_	FRACTURES PER FOOT	DESCRIPTION		12		ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
ASE	SE E B	(%) Q	Zĕ	DEPTH, TYPE, ORIENTATION, ROU	GHNESS,	Į,		WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
무유장	888	αD	AC R.F	PLANARITY, INFILLING MATERIA	L AND	MB		AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SC	吕빌	R	유	THICKNESS, SURFACE STAINING, AND	TIGHTNESS	SΥ		CHARACTERISTICS	DROFS, 1EST RESULTS, ETC.
							Н	Limestone	
_					_		L	91.0-93.3' - pale yellowish brown,	_
								(10YR 6/2), strong HCl reaction,	
-					-			medium strong (R3), 20% voids	1
I -					-		$\vdash$	<1/8", many fossil molds up to 1/2"	-
								(many elongate), highly fossiliferous	
								93.3-96.0' - yellowish gray, (5Y 7/2),	1
I -					-		H	very fine grained, very strong HCI	-
_					_		L	reaction, weak to medium strong (R2	_
								to R3), 0-5% 1/16" voids (increase in	
					-			voids to 10% at end of core 95.9-96.0'), zones of very weak rock	1
-					-		F	(R1) at 93.3-93.5', 93.85-94.2', and	1 -
1							L	94.55-94.85'	
								Bottom of Boring at 96.0 ft bgs on	]
-							H	5/23/2007	-
-					-		F		-
							L		
1 7					_		Γ		1
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PROJECT NUMBER:	BORING NUMBER:	
338884.FL	D-02	SHEET 1 OF 3

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724164.5 N, 457585.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLIN	GIVIETH	OD AND	EQUIPMI	ENT : CME 550 S	//N 1860/3, mud rotary, cathead, NW rods, 3-//8" tri-cone bit OHIENTATION: Vertical
WATER	L <u>EVELS</u>	: 1.0 ft bo	gs <u>on 04/2</u>	20/07	START: 4/20/2007 END: 4/20/2007 LOGGER: T. Stewart
				STANDARD	SOIL DESCRIPTION COMMENTS
≳∂€	SAMPLE	INTERVA	I (ft)	PENETRATION	8
N E	07		, ,	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, $\frac{1}{2}$ DEPTH OF CASING, DRILLING RATE,
AACH		RECOVE	:RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR 🙀 DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
о́о́ш 41.3	0.0			(N)	Topsoil (OL/OH)
41.5	0.0			1-2-2	\(\sqrt{0.0-0.2'}\) - grayish black, (N2), moist \(\sqrt{\frac{1}{2}}\)
_		1.2	SS-1	(4)	Poorly Graded Sand With Organics (SP)
1	1.5			· /	├\\ 0.2-0.6' - medium gray, (N5), moist, very loose, very
					\  \  \  \  \  \  \  \  \  \  \  \  \
-	1				Silty Sand (SM)
-	-				0.6-1.2' - dark yellowish orange, (10YR 6/6), moist to
-					wet, very loose, fine grained, 15-20% nonplastic fines,   _
_					sand is silica
_	]				]
5	5.0				1
36.3	0.0				Poorly Graded Sand (SP)
-		0.8	SS-2	6-7-7	5.0-5.8' - white, (N9), wet, medium dense, very fine to -
-		0.8	55-2	(14)	fine grained, trace nonplastic fines, trace black particles, sand is silica
_	6.5				particles, sand is sinca
					]
1					
	1				1 1
-					<u> </u>
-					
-					
_					
10	10.0				
31.3					Sandy Lean Clay (CL)  Driller's Remark: Hard drilling at 12.0'
-	1	1.2	SS-3	5-4-4	10.0-11.2' - greenish gray w/ pale green and olive gray with pale green and olive gray mottling, (5GY
-	11.5			(8)	6/1, 10G 6/2, and 5Y 3/2), wet to moist, stiff, low to
-	11.5				\ medium plasticity, slow dilatancy, 40% very fine silica   -
-					sand
_					<b>-</b>
l _					
	1				1 1
-	1				<b>1</b>
					<u> </u>
15 26.3	15.0				Sandy Silt And Limestone (ML)
				7-4-15	15.0-16.3' - gravish yellow, (5Y 8/4), wet, very stiff,
_		1.3	SS-4	(19)	low plasticity, rapid dilatancy, mild to moderate HCl
	16.5			, ,	reaction, 35-40% fine to coarse sand, 20% fine to coarse gravel-sized limestone fragments; carbonate,
					Colaise graversized infrestorie fragments, carbonate,
-	1				7 1
-	1				1 1
-	-				
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_					
20					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-02	SHEET	2	OF	3	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724164.5 N, 457585.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

						, cathead, NW rods, 3-7/8"			ORIENTATION: Vertical
WATER	LEVELS	: 1.0 ft b	gs on 04/2	20/07 <b>T</b>	START : 4/20/2007	END : 4/20/2007	LOGGE	R : T. <b>T</b>	Stewart
≥□≎	04145: -		11 (fr)	STANDARD PENETRATION		SOIL DESCRIPTION		)G	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		TEST RESULTS	SOIL NAME,	USCS GROUP SYMBOL,	COLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
FAC ATI		RECOVE	<u> </u>		MOISTURE C	CONTENT, RELATIVE DEN	ISITY OR	BOL	DRILLING FLUID LÓSS, TESTS, AND INSTRUMENTATION
DEP SUR ELE			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY				INSTRUMENTATION
21.3 - - -	20.0	1.2	SS-5	42-50-38 (88)	nonplastic, rapid  35% fine to coars	imestone (ML) sh yellow, (5Y 5/4), mois dilatancy, moderate HCl se sand, 20% fine to coar estone fragments, all carb	reaction, rse	- - - - -	-
- - - -					\similar to 15.0-16			-	Driller's Remark: 22.5' got hard, then began soft drilling within next few inches
25 16.3	25.0 25.2	0.0	SS-6	50/2	No December 05	0.05.01			-
		. 0.0	33-0	(50/2")	No Recovery 25.	U-23.2		- - - - -	- - - - -
30	30.0							1	]
11.3	31.5	1.3	SS-7	22-22-12 (34)	hard, nonplastic, reaction, 35% fine	yellowish orange, (10YR rapid dilatancy, moderate e to coarse sand, 10% finstone fragments, all carb	e HCI ne	- - - - - - - -	Driller's Remark: 27.5' soft drilling to 30.0'
-								4	Driller's Remark: Hard again at 34.5'
_	25.0							-	- Dillier 3 Hemaik. Hard again at 54.5
35 6.3 - - - - - - - - 40	35.0	0.1	<b>SS-8</b> ∫	50/1.5 (50/1.5")	and gray yellowis 5Y 8/4), olive colo particles, disc sha Begin Rock Corir	olive gray to moderate ol sh fragments, (5Y 5/2 to ored fragments have 10- aped	5Y 4/4 and	- - - - - - -	- - - - - - -
			<u> </u>					$oldsymbol{ol}}}}}}}}}}}}}}}}}}$	



PROJECT NUMBER:	BORING NUMBER:	
338884.FL	D-02	SHEET 3 OF 3

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724164.5 N, 457585.0 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS: 1.0	) ft bg:	s on 04	4/20/07 START : 4/20/2007 END : 4/	20/20	D7 LOGGER : T. Stewart	
>00	(9			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
ANE N (ft	N AND ≪ (%		ES T	DESCRIPTION	3.00	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
6.3	35.0		1		Н	Limestone	Driller's Remark: 100%
			1		፲	<ul> <li>35.0-39.8' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction,</li> </ul>	circulation -
_			0	35.95' - Fracture, 60 deg, rough, undulating, tight	」	weak to medium strong (R2 to R3), decreasing to very weak (R1) below	_
_				36.6' - Mechanical break, horizontal, rough, undulating, tight	上	38.5', 5-20% voids <1/16", poorly	_
_	R1-NQ 5 ft	96	0	undulating, tigrit	上	fossiliferous (clasts up to 3/16"), trace yellowish gray (5Y 7/2)	-
_	96%			-	┢	mottling, secondary recrystallization	-
_			0		╁	_	_
-				-		-	R1: 6 minutes
40	40.0		0		╁	-	-
1.3	40.0		NR)	_	H	— No Recovery 39.8-40.0' Limestone	Driller's Remark:
	]		2	40.5' - Fracture or mechanical break, 60 deg, rough, undulating, tight	F	40.0-41.5' - light olive gray, (5Y 5/2), moderate to strong HCl reaction,	Maintained full circulation -
			1	40.6' - Fracture or mechanical break, 70 deg,	F	very weak (R1), 5-10% voids <1/16",	
_			'	rough, undulating, tight 41.4' - Fracture or mechanical break, 0-10	F	non-fossiliferous, transitional to 41.0-44.5'	-
-	R2-NQ 5 ft	86	>10	deg, rough, planar, tight 42.0-42.2' - Fracture zone	F	41.0-44.5' - light olive gray, (5Y 5/2), fine grained, moderate to strong HCl	_
-	90%			42.4' - Mechanical break, horizontal, rough,	H	reaction, very weak (R1), 15-40% voids <1/16" and increasing to <3/16"	-
_	-	ļ	0	undulating, tight	Ħ	with depth, poorly fossiliferous with	R2: 4 minutes
-			0			increasing cavities with depth (up to 1/2" elongate), secondary	-
45	45.0		NR	·	Ħ	recrystallization No Recovery 44.5-45.0'	Total Depth at 45.0' on
-3.7	10.0				1	Bottom of Boring at 45.0 ft bgs on	4/20/07
						- 4/20/2007 -	
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P	PROJECT NUMBER:	BORING NUMBER:					
1 :	338884.FL	D-03	SHEET	1	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724234.5 N, 457645.5 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-7/8" and 6" tri-cone bits ORIENTATION: Vertical

						ary, catrieau, invv rous, 4-776			ORIENTATION: VEItical
WATER	LEVELS	. ι.ο π οι	gs on 3/24		START : 3/24/2007	END: 3/26/2007 SOIL DESCRIPTION	LOGGE	K: I	. Stewart COMMENTS
ŞQ⊋	044:5:		1 (6)	STANDARD PENETRATION		SOIL DESCRIPTION		<b>-</b> 6	COIVIIVIENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		TEST RESULTS	SOIL NAM	IE, USCS GROUP SYMBOL	COLOR.	SYMBOLICLOG	DEPTH OF CASING, DRILLING RATE,
H B ATIC		RECOVE	ERY (ft)		MOISTURE	E CONTENT, RELATIVE DE	NSITY OR	Ē	DRILLING FLUID LOSS, TESTS, AND
LEV LEV			#TYPE	6"-6"-6" (N)	CONSISTEN	ICY, SOIL STRUCTURE, MI	NERALOGY	Z X	INSTRUMENTATION
42.0	0.0	l	l 	(14)	Topsoil			1/2	
-	0.0	1.2	SS-1	1-2-2		k gray to grayish black, (N		4	24" split spoon, using N-rod -
-		1.2	33-1	(4)	\20-25% fine to	coarse gravel sized roots	and wood		Driller switches to a 6.0" tricone roller drill bit
-	1.5				Poorly Graded	d Sand With Organics (SI		4	for run between SS-1 to SS-2
-					0.55-1.2' - very	/ light gray, (N8), moist, ve ined, 5% nonplastic fines,	ery loose, very	+	Mix mud (added 3/4 of 50-lb bag quick Gel
-					roots/organics,	, silica sand	1576	4	brand bentonite)
_								-	-
_								4	_
_								4	_
-								1	_
5	5.0				0:14 0 1 (0:1	A)		-	
37.0				6-5-4	Silty Sand (SN 5.0-5.7' - mode	<b>/I)</b> erate yellowish brown to d	ark vellowish		_
_		0.7	SS-2	(9)	\tag brown, (10YR \frac{\pi}{2})	5/4 to 10YR 4/2), wet, loos	se, very fine	₫"	_
_	6.5					, silica sand, 15% nonplas to fine sand-sized black p		1	
					udoo vory mio	to mile dana dizea black p	jar doloc		
								1	
								1	
-								1	1
10	10.0							1	1
32.0					Silt (ML)			┪╢	Driller's Remark: Maintaining full mud
-		1.2	SS-3	11-11-11		ayish yellow, (5Y 8/4), wet tancy, moderate HCl react		111	circulation –
-	11.5			(22)	very fine to fine	e sand-sized grains, carbo		Щ	4
-	11.0				∖materials		/	1	1
-								1	-
_								1	-
-								1	-
-								1	-
-								+	-
,	45.0							+	-
15 <u> </u>	15.0				Silt (ML)			+	Driller's Remark: Spoon unseated before
-		1.2	SS-4	18-32-50/4"		me as 10.0-11.2'		$ \mathbf{I} $	measure of last 6", drilled down to 18.0' to
-	16.3			(82/10")	Sandy Silt (ML			∄	install 20.0' of 6" diameter casing, then switched over to 4-7/8" drill bit and continued
-						oderate yellow, (5Y 7/6), n oid dilatancy, moderate HC		1	to 20.0' to take SS-5 (20.0-21.5') Driller's -
-					similar to 15.0-	-15.9', 25% fine to coarse	sand-sized	+	Remark: Only 15.0' of 6" diameter
-						ments, all carbonate		+	-
-								+	-
-								+	-
-								-	-
-								4	_
20								$\bot$	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	D-03	SHEET	2	OF	4

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724234.5 N, 457645.5 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-7/8" and 6" tri-cone bits ORIENTATION: Vertical

WATER	LEVELS	: 1.5 ft b	gs on 3/24	1/07	START : 3/24/2007 END : 3/26/2007	LOGGEF	R : T.	Stewart
>				STANDARD	SOIL DESCRIPTION		၅	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLO	)R	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
TH BI		RECOVE	<u> </u>		MOISTURE CONTENT, RELATIVE DENSITY CONSISTENCY, SOIL STRUCTURE, MINERAL	OR	1BOL	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEP SUR ELE			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, WIINERAL	.001	SYN	INSTRUMENTATION
22.0 - - - - -	20.0	0.1	\ <u>\$\$-</u> 5_/	50/1 (50/1")	Limestone Fragments 20.0-20.1' - grayish yellow to moderate yellow, to 5Y 7/6), moderate HCI reaction, poorly fossil (molds), trace (1/2") dusky yellowish brown (10 2/2) concretions	liferous		11:57 at 20.0' currently 15' 6" diameter casing in place, using 5.0' N-rod lengths to advance a 4-7/8" tricone roller drill bit Driller's Remark: Very hard drilling
-	-					-	-	-
25 <u> </u>	25.0 25.4	0.4	SS-6	50/5	Limestone Fragments			
- - - - -		0.4	33-0	(50/5")	25.0-25.4' - moderate yellowish brown, (10YR symptoms of the color of	ized /		- - - - - - -
30 <u> </u>	30.0	0.4	SS-7	50/5	Silt With Sand (ML)		НΠ	Driller's Remark: Hard drilling and a lot of
35_7.0				<u>(50/5")</u>	30.0-30.4' - dark yellowish orange, (10YR 6/6), nonplastic, rapid dilatancy, moderate HCI react 20-25% fine to medium sand-sized material, all carbonate Begin Rock Coring at 31.0 ft bgs See the next sheet for the rock core log	tion, /		chatter, very slow drilling advancement  Driller's Remark: 15:25, set 3' NW casing to 30' then switch to core runs  Driller's Remark: 15:33 tape measured depth of boring is 31.0'  NQ core barrel assembly NQ drill bit is a hard rock formation drill bit NW casing advancer w/ retractable tricone roller drill bit accessary (serial # 83963-CN)  Switch to rock coring at 31.0'
						- - - - - -		



PROJECT NUMBER:

33884.FL BORING NUMBER:

D-03 SHEET 3 OF 4

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724234.5 N, 457645.5 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

				TENT . CIVIE 330 3/N 180073, Midd Totally, NQ tools, NVV			ORIENTATION: Vertical
WATER	LEVELS: 1.5	ft bg	s on 3	/24/07 START : 3/24/2007 END : 3/	26/20	D7 LOGGER : T. Stewart	
				DISCONTINUITIES	(n	LITHOLOGY	COMMENTS
§₽€	5%		'n	DESCRIPTION	SYMBOLIC LOG		
O A E	Z Z Z	_	Æ	DESCRIPTION	<u></u>	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
ESE.	IN EN	(%) Q	l⊒ö	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	걸	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
뜨쥬핑	R850	ØΒ	AC R F	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	ď	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Š	CHARACTERISTICS	BROTO, TEOT REGGETO, ETG.
	31.0 R1-NQ		>10,	31.0-31.2' - Fracture zone, fragments of core,		Limestone	
-	1 ft	0	NR	disc-shaped	Ш	<ul> <li>31.0-31.2' - grayish yellow mottled</li> </ul>	R1: 2 minutes
l -	32.0 20%				Н	with minor light olive brown, (5Y 5/4	
					ш	with 5Y 5/6), moderate to strong HCl	
-	1		1	32.5' - Fracture, 55-90 deg, smooth,		- reaction, medium strong (R3), gray	1
-	-			undulating, open 1/8"	₽	staining, poorly fossiliferous (casts), spherical voids (up to 1/16") over	-
l _			2	33.3' - Fracture, 80 deg, smooth, undulating,	Н	- 10% of surface	
			-	open 1/8"		No Recovery 31.2-32.0'	
-	R2-NQ			33.5' - Fracture or mechanical break,	ш	Limestone	1
_	5 ft	84	1	horizontal, rough, undulating, open 1/4"	Н	<ul> <li>32.0-36.7' - grayish yellow, (5Y 8/4),</li> </ul>	-
35	94%			34.15' - Fracture, 50-60 deg, rough,	Н	very fine grained, strong HCl	
7.0				undulating, tight	Ш	reaction, poorly fossiliferous with	
I -	†		1	35.5' - Bedding plane or mechanical break,	$\vdash \vdash$	- several large (up to 1" elongate)	1 +
-	4			horizontal, rough, undulating	$\vdash \vdash$	cavities/molds, some with secondary infilling, variable voids (<1/16") over	1557
			0	3		3-20% of surface increasing with	R2: 7 minutes
1	37.0		NR	36.5' - Mechanical break	$\square$	depth, medium strong (R3) from	1
-	37.0		INIC		Н	32.0-34.8', abruptly very weak (R1)	1
_			3		Н	_ below 34.8'	1
				37.55' - Bedding plane, horizontal, rough,		No Recovery 36.7-37.0'	
-	1			undulating, open 1/2"	ш	Limestone	1
-	1		1	37.7' - Fracture, 60-70 deg, rough,	+	_ 37.0-37.55' - Same as 32.0-36.7'	1 -
1 -	1			undulating, tight 38.0' - Bedding plane or mechanical break,		except very weak (R1), voids	_
	R3-NQ			horizontal, rough, undulating, open up to 1"	ш	(<1/16") over 3% of surface 37.55-40.7' - dark yellowish orange,	
40	5 ft 74%	50	0	38.8, 39.5, 39.8, 40.0' - Mechanical break (4)	Н	(10YR 6/6), fine grained, moderate	1
40 2.0	7470				Н	HCl reaction, weak (R2), voids (up to	-
2.0	1		2	40.25' - Fracture or mechanical break,		_ 3/16") over 25-35% of surface, trace	
				horizontal, rough, undulating, tight	Н	fine grained organic particles	
-	1			40.35, 40.6' - Mechanical break or bedding	11	No Recovery 40.7-42.9'	R3: 4 minutes
-	-		NR	plane (2), horizontal, rough, undulating, tight	ш	-	Stop Drilling for the day at -
l -	42.0				$\vdash$	<u>-</u>	17:00
			NR		Н		Driller's Remark: 1.5' below
-	1		INK	-	ш	-	ground surface water level -
-	-			-	17.7	Sand With Silt (SM)	in 6" casing, 08:05 on 3/25/07 will install 6"
_	1			_		_ 42.9-46.4' - very pale orange, (10YR	diameter casing down to
	R4-NQ					8/2), very fine to fine grained, mild	2.0' increasing circulation
1 -	4.5 ft	0		•	11111	HCI reaction, rounded, clean sands,	around 15.0' of 6" diameter
-	80%		NIA		-	_ 10-15% pale yellowish orange (10YR	casing, will then install 3" -
45			NA			5/6) fine grained particles, abrupt — contact at 46.4'	NW casing to 41.0'
-3.0						Contact at 40.4	R4: 8 minutes
1 -	1				1	-	Core barrel locking during - run (possible sands)
-	1				1	_	Turi (possible salius)
I -	46.5				Щ	Limostono	Only 4.5' - unable to reach
1	47.0 R5-NQ 0.5 ft	100	2	46.6' - Bedding plane or mechanical break,	Н	Limestone 46.4-46.5' - light olive gray, (5Y 5/2),	full 5.0' stroke
1 -	100%			horizontal, rough, undulating, tight	ш	moderate HCl reaction, medium	Install 3" NW casing down
-	1 (100 /8/		3	46.7" - Mechanical break	$\square$	strong (R3), moderately fossiliferous	to 46.0'
1 -	]			47.0' - Bedding plane or mechanical break,	Н	_ (few molds, mostly casts), voids	R5: 2 minutes
1				40-50 deg, rough, undulating, gray stains on surface, open to tight	Ш	(<1/16") over 10-15% of surface,	
1 -	1		3	47.45' - Fracture or mechanical break,	П	trace black particles up to 1/2"	1
-	R6-NQ			vertical, tight	₽	_ (possibly organics)	1 -
1	4.5 ft	30	>10	47.85' - Fracture or mechanical break,	Н	46.5-47.0' - Same as 46.4-46.5'	1
50	100%			horizontal, rough, undulating, tight			1
-8.0	†			48.05' - Bedding plane or mechanical break, —	ш	<del>-</del>	I
-			>10	horizontal, rough, undulating, tight	H	_	D6: 0 minutes
				48.25, 48.65' - Mechanical break (2)			R6: 9 minutes
							1
				•	-		•



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-03	SHEET	4	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724234.5 N, 457645.5 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: M. Griffin

WATER	LEVELS : 1.5	ft bg	s on 3	/24/07 START: 3/24/2007 END: 3/	26/20	07 LOGGER : T. Stewart	
>00				DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	L H.	(%) Q	TUR OC	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SOLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
TEN E	CORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ΔОШ	0716	ď		49.20' - Fracture or mechanical break,	S	Limestone	
-	51.5		>10	horizontal, rough, undulating, tight	岸	<ul> <li>47.0-51.5' - yellowish gray, (5Y 7/2),</li> </ul>	-
-			0	49.25' - Fracture, horizontal and 60-70 deg, rough, undulating, tight		mild to moderate HCl reaction, weak (R2), very weak (R1) zone at 50.0',	-
-				49.9-50.3' - Fracture zone	╀	<ul> <li>spherical voids (1/16") over 20-30%</li> </ul>	-
-			4	50.65' - Fracture, 80-90 deg, rough, undulating, tight		of surface, poorly fossiliferous, casts/molds (up to 1/2"), up to 15%	-
-	. D7 NO			50.95-51.5' - Fracture zone or mechanical	L	<ul> <li>brownish black particles as</li> </ul>	-
-	R7-NQ 5 ft	85	0	break, vertical, tight 52.3, 53.0' - Mechanical break (2)		laminations (up to 1/16" thick) 51.5-56.5' - yellowish gray to light	-
-	100%			53.15-53.35' - Fracture zone	$\vdash$	<ul> <li>olive gray, (5Y 7/2 to 5Y 5/2), mild to</li> </ul>	_
55 <u> </u>			2	54.9' - Fracture or mechanical break, 40-50		moderate HCl reaction, weak to medium strong (R2 to R3), spherical	_
-13.0				deg, rough, undulating, tight	片	<ul><li>voids (up to 1/16") over 5-10% of</li></ul>	R7: 16 minutes
-			0		H	surface, black laminations (<1/16" thick) across entire interval, trace	- IVI. 10 minutes
-	56.5 R8-NQ	400			H	<ul> <li>coarse grained black particles</li> </ul>	-
-	57.0 0.5 ft	100	0		ш	(possible organics) 56.5-57.0' - Same as 51.5-56.5'	R8: 1 minute -
-	\100%/		2	57.5, 57.8, 59.0' - Fracture (3), <10 deg,	世	57.0-61.35' - yellowish gray to light	-
-				rough, undulating, open 1/4"-1/2"		olive gray, (5Ý 7/2 to 5Ў 5/2), fine grained, moderate HCl reaction,	-
-			0		+	weak to medium strong (R2 to R3),	-
-	R9-NQ				H	voids (<1/16") over 20-30% of surface, few fossil molds and casts	-
-	5 ft	75	2	59.5, 59.6' - Mechanical break (2)	Ľ	up to 1/2" elongate	-
60 <u> </u>	87%			59.95' - Fracture or mechanical break, 25-35	H	_	
-	-		2	deg, rough, undulating, open 1/2"	₽	-	-
-	-		0	60.35' - Fracture, 20-30 deg, rough, undulating, open 1/8"	厂	-	R9: 10 minutes
-	-		NR	60.8' - Fracture or mechanical break,	世	- No Recovery 61.35-62.0'	Complete boring 3/25/07,
-	62.0			horizontal, smooth, undulating	┢╾	Bottom of Boring at 62.0 ft bgs on	Total Depth 62.0' 08:03 3/26/07 water level
-	-					- 3/26/2007	2.5' below ground surface to top of mud surface level
-						<del>-</del>	10:00 3/26/207 finished -
-					1	-	abandonment Grout seeping up out of
-					-	_	ground surface 3' away -
-				_	4	_	from hole
-					-	-	-
-					-	-	-
-					-	-	-
-					-	-	-
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					$\vdash$		-
1							



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-04	SHEET	1	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.5 N, 457831.9 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 2.0 ft bo	gs on 3/28	3/07	START : 3/28/2007 END : 4/4/2007 LOGGER : R. McComb
300				STANDARD	SOIL DESCRIPTION COMMENTS
ANC (#	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DANSITY ON DRILLING FULL LOSS TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
41.9	0.0				Topsoil (OL)  Water level: 2.0' below ground surface
		0.8	SS-1	2-3-2 (5)	\(\sqrt{0.0-0.2'}\) - black, (N1), moist, roots, wood debris \(\sqrt{-\frac{1}{2}}\) \(\sqrt{\text{Poorly Graded Sand (SP)}}\)
_	1.5			. ,	\ \ 0.2-0.8' - medium dark gray, (N4), moist, loose, fine \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-	-				
-	-				
-	-				
-	-				
-	1				
5	5.0				1
36.9				4.4.4	Poorly Graded Sand (SP)  5.0-5.95' - very light gray grading to light gray, (N8 to /-
		1.0	SS-2	4-4-4 (8)	N7), wet, loose, fine grained, silica sand, trace
-	6.5				\nonplastic fines gradually increasing to silty sand (SM) with 25% low plasticity fines
-	-				-
-	-				
-	-				
-	-				
-					1
10	10.0				1.1
31.9				5-22-28	Sand With Limestone (SP) 10.0-10.2' - pale greenish yellow, (10Y 8/2), wet,
-	-	1.3	SS-3	(50)	loose, fine to coarse grained, strong HCl reaction, gravel-sized limestone fragments, 25% fine to coarse
-	11.5				∖ sand-sized grains, 15% nonplastic fines
-	1				
-					dense, fine to medium grained, strong HCl reaction,   25-30% low plastic fines, carbonate
-	1				Silt (ML)
					10.35-11.3' - moderate yellow and grayish yellow, (5Y   7/6 and 5Y 8/4), wet, nonplastic, rapid dilatancy, mild   -
					HCI reaction, carbonate
15_ 26.9	15.0				Cib (ML)
20.9	-	1,	SS-4	23-33-26	Silt (ML) 15.0-16.2' - Same as 10.35-11.3' except 5-10% very
-	10.5	1.2	55-4	(59)	fine sand-sized grains
-	16.5				-
-	1				
	1				
					] [
					] ]
-					]
20_					<del>                                     </del>



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-04	SHEET	2	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.5 N, 457831.9 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 2.0 ft bg	gs on 3/28	8/07 5	START : 3/28/2007 END : 4/4/2007 LOGGER : R. McComb
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		RECOVE	ERY (ft)	120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR,  MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
HTA ANA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
<u> 21.9</u>	20.0	0.3	SS-5	(N) 50/3.5	Silt (ML)
	20.0	0.5	30-3	(50/3.5")	20.0-20.3' - Same as 15.0-16.2' except 5-10% very
-					\fine sand-sized grains, trace medium to coarse \ \ \sand-sized grains
-					Saliu-sizeu granis
-					
-					
-					
-					
-					
25 <u> </u>	25.0				Silt With Sand And Limestone (ML)
-		1.2	SS-6	10-13-21	25.0-26.2' - grayish yellow, (5Y 7/2), nonplastic, rapid  ┩│││
-		1.2	33-0	(34)	dilatancy, mild to moderate HCl reaction, 20% fine to coarse sand-sized grains, 15% fine to coarse
-	26.5				\gravel-sized limestone, carbonate / -
-					
-					Driller's Remark: Chatter at 27.5'
-					
-					
-					
30	30.0				
11.9	30.0				Silt With Sand (ML)
-		1.5	SS-7	24-32-38	30.0-31.45' - Same as 25.0-26.2' except 20-25% very fine to fine sand-sized grains, no gravel-sized
-	31.5			(70)	fragments
-	01.0				<u> </u>
-					1 1
_					1 1
-					1 1
-					1 1
-					1 1
35	35.0				1 1
6.9					Sandy Silt (ML)
		1.3	SS-8	13-19-14 (33)	35.0-36.3' - light olive brown to moderate olive brown, (5Y 5/6 to 5Y 4/4), wet, low plasticity, rapid dilatancy,
	36.5			(50)	mild HCl reaction, 25-30% fine to coarse sand-sized quality grains, trace fine gravel-sized limestone, carbonate
					\ grains, trace line graver-sized limestone, carbonate   -
					] [
	40.0				]
_	40.1	0.1	SS-9	50/1 (50/1")	Limestone Fragments 40.0-40.1' - moderate olive brown to olive brown, (5Y - Driller's Romark: Chatter at 39.5'
_				(00/1)	\\\daggeright\daggerig
_					fragments
40					40.0' switch over to HQ rock coring
					Begin Rock Coring at 40.0 ft bgs See the next sheet for the rock core log
					232 232 232 232 232 232 232 232 232 232



PROJECT NUMBER:

338884.FL

BORING NUMBER:

D-04

SHEET 3 OF 5

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.5 N, 457831.9 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

			<u> </u>	MENT . CIVIE 550X 5/N 540255, Mud Totally, NQ tools, HV		· <del>J</del>	ORIENTATION : Vertical
WATER	LEVELS : 2.0	ft bgs	s on 3		1/2007		,
>^~				DISCONTINUITIES	ڻ ا	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
HH	Z,A	(%	뿔		일	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
ΞĂΞ	#P.00	(%) <sub>Q</sub>	EE	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BO BO	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
		a Q	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	₹	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
1.9		ш.	>10	40.0.44.0! Fracture zone	) ''	Limestone Fragments	
1.5 _	40.0			40.0-41.0' - Fracture zone		Limestone Fragments - 40.0-40.4' - grayish yellow, (5Y 7/2),	
			NR			very fine grained, moderate HCI	
I -				41.05' - Fracture, 40-60 deg, rough, planar,	Н	reaction, very weak to weak (R1 to	Driller's Remark: Very hard
-			5	open		- R2), voids (<1/16") over 10-15% of	drilling from 40.0-41.5', –
-	D4 NO			41.15' - Fracture, rough, planar and	₽₽	surface No Recovery 40.4-41.0'	42.5'
I _	R1-NQ 5 ft	40	2	undulating, open 41.4, 41.5' - Fractures (2), 0-60 deg, rough,	Н	- Limestone	_
	88%	.0	-	undulating, open		41.0-45.0' - light olive gray, (5Y 5/2),	
I -				41.3' - Fracture, 0-<5 deg, rough, undulating,	Н	moderate HCl reaction, medium	1
-			3	open	団	strong (R3), voids covering 10-15%	1
-				42.45' - Fracture, 0-60 deg, rough,	╁┼┼	of surface increasing to 20-30% below 42.5', partially infilled voids	R1: 29 minutes
_			4	undulating, open 42.8' - Fracture, rough, planar to undulating,	Н	(1/4") from 42.2-42.4', 1-3% cavities	R1. 29 Hilliutes
45	45.0		'	tight	Ш	(up to 1-9/16"), trace fossils	
-3.1				43.3' - Fracture, horizontal, rough, undulating,	$\vdash$ $\vdash$ $\vdash$	45.0-45.8' - light olive gray, (5Y 5/2),	
1 -			1	open -	口	<ul> <li>fine grained, mild HCl reaction,</li> </ul>	1
-				43.65' - Fracture, <5 deg, rough, undulating, open 1/2"-3/4"		extremely weak (R0), voids covering 5-10% of surface, many cavities up	45.8-50.0' core fell back -
_				43.9, 44.05, 44.7' - Fractures (3), <5-60 deg,	Н	to 3/8" long, very friable	into borehole, upon
				rough, undulating, open		No Recovery 45.8-52.0'	recovering there was no core retrieved because of
I -	R2-NQ			44.8, 44.95' - Fractures (2), <5 deg, rough,	Ш	-	poor quality of rock and
-	5 ft	0		undulating, open -		-	being very friable
-	16%		NR	45.8' - Fracture, horizontal, rough, undulating	$\square$	_	-
_				_	Н	_	_
I -					Н	-	R2: 3 minutes
	50.0			-		-	1
50 -8.1	50.0				₩		End 4/3/07 at 50.0'
				-	H	-	Begin 4/4/07 -
_			NR		Щ	_	
			INIX		Н		
_				-	ш	=	1
-	R3-NQ			-		Poorly Graded Sand (SP)	-
_	5 ft	0	NA	-		- 52.0-53.0' - moderate yellow to dusky	_
I _	60%			_		_ yellow, (5Y 7/6 to 5Y 6/4), wet, loose, _	
					Ш	very fine to fine grained, strong HCl	
-			0	-	ธ	- \reaction, 10% silica, 90% carbonate	1
-				-	П	Limestone Fragments  53.0-54.0' - moderate olive brown,	R5: 6 minutes
-			0	-	口	(5Y 4/4), mild HCl reaction, very fine	Driller's Remark: Harder
55	55.0				₽₩	to fine gravel, silt to fine sand-sized	drilling at 54.0' bgs
-13.1					Ш	with up to 1/8" limestone fragments	
					Н	Limestone 54.0-55.0' - moderate olive brown to	]
-				-	世	light olive brown, (5Y 4/4 to 5Y 4/6),	1
-				-	₽₽	mild HCl reaction, extremely weak to	-
-	B		NR	-	H	very weak (R0 to R1), carbonaceous	-
I _	R4-NQ 5 ft	0		_	口	material covering some surfaces, voids covering 30-40% of surface,	
	24%	3			Н	infilling with sandy texture, fine	
				_	ш	gravel-sized rock fragments	Driller's Remark: Hard
-				-	╁┼	No Recovery 55.0-58.8'	drilling 57.9 - 60.0'
-			1	58.8' - Fracture, rough, undulating, open -	버	-	R4: 10 minutes
I _			>10	59.1' - Fracture, 0-60 deg, rough, undulating,	Ш	=	114. 10 Hilliutes
60	60.0			open	Н		
					ll		
					_		



PROJECT NUMBER:

33884.FL

BORING NUMBER:

D-04

SHEET 4 OF 5

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.5 N, 457831.9 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

## A Process of Section 1 Proc	WATER	LEVELS : 2.0	ft bgs	on 3/	28/07 START: 3/28/2007 END: 4/	/4/200	LOGGER : R. McComb	_
4 59.4 - Fracture, 0-40 deg, rough, undulating, open 58.8 - 59.6 - light olive brown, (5Y 56), very fine grained, mild HCI reaction, week (R2), voids over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities of surface, rare 1/16 - 1/8 caviti	≳O.⊋	(%			DISCONTINUITIES	၂	LITHOLOGY	COMMENTS
4 59.4 - Fracture, 0-40 deg, rough, undulating, open 58.8 - 59.6 - light olive brown, (5Y 56), very fine grained, mild HCI reaction, week (R2), voids over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities of surface, rare 1/16 - 1/8 caviti	SELO E AN ON (f	UN, AND (9)	· (c)	RES	DESCRIPTION			SIZE AND DEPTH OF CASING,
4 59.4 - Fracture, 0-40 deg, rough, undulating, open 58.8 - 59.6 - light olive brown, (5Y 56), very fine grained, mild HCI reaction, week (R2), voids over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities over 1-5% of surface, rare 1/16 - 1/8 cavities of surface, rare 1/16 - 1/8 caviti	TH E	SE RI IGTH SOVE	%	CTU	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	/BOL	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
18.1  4 59.4 - Fracture, 0-40 deg, rough, undulating, open 58.6 - 59.6 - light olive brown, (5Y 56), very fine grained, mild HCl reaction, where (R2), voids over 1-5% of surface, rare 1/16 - 1/8 cardies ove	DEF SUF ELE	REC	a Q	FRA PEF		SYN		DROPS, TEST RESULTS, ETC.
75 9.6 - Fracture, horizontal, rough, planar, open for surface, rare 1/16-1/8' cavities over 1-5% of surface, rare 1/16-1/8' cavities over 1-5% of surface, rare 1/16-1/8' cavities 98.6-8.0' Fracture, rough, undulating, open 69.9.6.17' - Fracture, rough, undulating, open 69.9.6.17' - Fracture, rough, undulating, open 69.9.6.17' - Fracture, rough, undulating, open 69.9.6.17' - Fracture, rough, undulating, open 61.9' - Fracture, rough, undulating, open 61.9' - Fracture, rough, undulating, open 61.9' - Fracture, rough, undulating, open 61.9' - Fracture, rough, undulating, open 62.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 63.6' - Fracture, rough, undulating, open 65.0' - Fracture, rough, undulating, open 72.4' - Zer-facture, 80 deg, rough, stepped, open 72.4' - Zer-facture, 80 deg, rough, undulating, open 72.4' - Zer-facture, 80 deg, rough, undulating, open 73.5' - Fracture, 80 deg, rough, stepped, 100%, 10						ш		
R5-NQ 5 ft 7 Fracture, 40 deg, rough, undulating, open 60.2 Fracture, 25 deg, rough, undulating, open 60.2 Fracture, 55 deg, rough, undulating, open 65.8 ft 7 Fracture, 55 deg, rough, undulating, open 65.8 ft 7 Fracture, 40 deg, rough, undulating, open 65.8 ft 7 Fracture, 55 deg, rough, undulating, open 65.8 ft 7 Fracture, 55 deg, rough, undulating, open 65.4 ft 7 Fracture, 55 deg, rough, undulating, open 65.4 ft 7 Fracture, 55 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 65.4 ft 7 Fracture, 45 deg, rough, undulating, open 66.4 ft 8 Fracture, 70 deg, rough, undulating, open 66.4 ft 7 Fracture, 45 deg, rough, undulating, open 66.4 ft 7 Fracture, 45 deg, rough, undulating, open 66.4 ft 7 Fracture, 45 deg, rough, undulating, open 66.4 ft 7 Fracture, 45 deg, rough, undulating, open 66.5 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 45 deg, rough, undulating, open 67.8 ft 7 Fracture, 67 deg rough, undulating, open 67.8 ft 7 Fracture, 67 deg				-		丌	5/6), very fine grained, mild HCl	
PRS-NO 5 ft 74% 28 28 2	_			2		耳		_
S ft   28   2   2   2   2   2   2   2   2	_				open	Ш	59.6-60.0' - Same as 58.8-59.6'	_
surface do do de de la company	_		28	2	open	上		=
undulating, open 61.9 - Fracture, vertical, rough, light 62.1 - Fracture, set deg, rough, undulating, open 62.8, 63.2 - Fractures (2), <5 deg, rough, undulating, open 62.8, 63.2 - Fracture, set deg, rough, undulating, open 63.7 - Fracture, set deg, rough, undulating, open 63.7 - Fracture, set deg, rough, undulating, open 63.25 - Fracture, set deg, rough, undulating, open 63.25 - Fracture, set deg, rough, undulating, open 63.25 - Fracture, set deg, rough, undulating, open 63.26 - Fracture, set deg, rough, undulating, open 63.26 - Fracture, set deg, rough, undulating, open 63.26 - Fracture, set deg, rough, undulating, open 63.27 - Fracture, set deg, rough, undulating, open 63.28 - Fracture, set deg, rough, undulating, open 63.28 - Fracture, set deg, rough, undulating, open 63.28 - Fracture, set deg, rough, undulating, open 63.28 - Fracture, set deg, rough, undulating, open 63.28 - Fracture, set deg, rough, undulating, open 63.28 - Fracture, set deg, rough, undulating, open 63.28 - Fracture, set deg, rough, undulating, open 63.28 - Fracture, set deg, rough, undula	_	74%				-		-
R6-S 650	_			2	undulating, open	+	<ul> <li>60.0-62.0' - light olive brown, (5Y</li> </ul>	-
65	-					+		-
undulating, open 5 deg, rough, stepped, open 65.2°, Fracture, 4 deg, rough, undulating, open 65.3°, Fracture, 4 deg, rough, undulating, open 65.3°, Fracture, 4 deg, rough, undulating, open 65.3°, Fracture, 4 deg, rough, undulating, open 65.3°, Fracture, 4 deg, rough, undulating, open 65.3°, Fracture, 4 deg, rough, undulating, open 65.3°, Fracture, 4 deg, rough, undulating, open 65.3°, Fracture, 4 deg, rough, undulating, open 65.3°, Fracture, 4 deg, rough, undulating, open 65.3°, Fracture, 4 deg, rough, stepped, open 65.3°, Fracture, 70 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 66.3°, Fracture, 4 deg, rough, stepped, open 66.3°, Fracture, 4 deg, rough, stepped, open 66.3°, Fracture, 4 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 66.3°, Fracture, 4 deg, rough, stepped, open 66.3°, Fracture, 4 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 66.3°, Fracture, 5 deg, rough, stepped, open 74.1°, 6.3°, Fracture, 70 deg, rough, stepped, open 74.1°, 6.3°, Fracture, 70 deg, rough, stepped, open 74.1°, 6.3°, Fracture, 70 deg, rough, stepped, open 74.1°, 6.3°, Fracture, 70 deg, rough, stepped, open 75.0°, Fracture, 5 deg, rough, stepped, open 74.1°, 6.3°, Fracture, 70 deg, rough, stepped, open 75.0°, Fracture, 5 deg, rough, stepped, open 74.1°, 6.3°, Fracture, 70 deg, rough, stepped, open 75.0°, Fracture, 5 deg, rough, stepped, open 74.1°, 6.3°, Fracture, 70 deg, rough, stepped, open 75.0°, Fracture, 5 deg, rough, stepped, open 75.0°, Fracture, 5 deg, rough, stepped, open 75.0°, Fracture, 5 deg, rough, stepped, open 75.0°, Fracture, 5 deg, rough, stepped, open 75.0°, Fracture, 6 deg, rough, stepped, open 75.0°, Fracture, 6 deg, rough, ste	-	05.0		NR		H		-
open 65.25 - Fracture, <5 deg, rough, undulating, open 65.35 - Fracture, vertical, rough, undulating, open 65.35 - Fracture, vertical, rough, undulating, open 65.36 - Fracture, vertical, rough, undulating, open 65.36 - Fracture, vertical, rough, undulating, open 65.36 - Fracture, vertical, rough, undulating, open 65.36 - Fracture, vertical, rough, undulating, open 65.36 - Fracture, vertical, rough, undulating, open 65.36 - Fracture, vertical, rough, undulating, open 65.36 - Fracture, vertical, rough, stepped, tight 66.0-66.47 - Fracture, vertical, rough, stepped, tight 66.9 - Fracture, vertical, rough, stepped, tight 67.8 - Fracture, vertical, rough, stepped, tight 67.8 - Fracture, vertical, rough, stepped, tight 67.8 - Fracture, vertical, rough, stepped, tight 72.9, 73.4" - Fracture, horizontal, rough, undulating, open 72.4-72.9 - Fracture, 80 deg, rough, stepped, tight 72.9, 73.4" - Fracture, 20, 0-10 deg, rough, undulating, tight to open 74.1-74.6 - Fracture, 70 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, undulating 75.7" - Fracture, 45 deg, rough, undulating 75.7" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, open 76.6" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, open 76.6" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, open 76.6" - Fracture, 76 deg, rough, stepped, tight 75.0" - Fracture, 76 deg, rough, stepped, tight 75.0" - Fracture, 76 deg, rough, stepped, tight 75.0" - Fracture, 76 deg, rough, stepped, tight 75.0" - Fracture, 76 deg, rough, stepped, tight 75.0" - Fracture, 76 deg, rough, stepped, tight 75.0" - Fracture, 76 deg, rough, stepped, tight 75.0" - Fracture, 76 deg, rough, stepped, tight 75.0" - Fracture, 76 deg, rough, stepped, tight 75.0" - Fracture, 76 deg, rough, stepped, tight 75.0" - Fracture, 76 deg, rough, stepped,		05.0			undulating, open	$\Box$	except moderate HCl reaction, very	R5: 5 minutes
resulting the proper of the pr	-			4	open	$\dagger$	carbonaceous laminae at 62.4', rare	-
R6.NO 5 ft 17 1 1 56.35' - Fracture, vertical, rough, undulating, open 65.4-65.7' - Fracture, vertical, rough, undulating, open 66.8' - Fracture, 40 deg, rough, undulating, 10 ft 19 ft 1					, 0, 0,	Ħ		_
No Recovery 63.7-65.0  17 1 1 65.4-65.7 - Fracture, vertical, rough, undulating, open 65.8 - Fracture, 40 deg, rough, undulating, tight 60.9-66.4 - Fracture, 70 deg, rough, stepped, tight 66.9-67.8 - Fracture, 70 deg, rough, stepped, tight 72.9 - Fracture, horizontal, rough, undulating, open 70.70.0  R7-NO 70.0  R8-NO 70.0  R7-NO 70.0  R7-NO 70.0  R8-NO 70.0  R7-NO 70.0  R7-NO 70.0  R8-NO 70.0  R7-NO 70.0  R7-NO 70.0  R8-NO 70.0  R7-NO 70.0  R7-NO 70.0  R8-NO 70.0  R7-NO 70.0  R8-NO 70.0  R7-NO 70.0  R8-NO 70.0  R8-NO 70.0  R7-NO 70.0  R8-N				4	65.35' - Fracture, horizontal, rough,	]#	increase from 5-20% where rock is	
undulating, open 65.8" - Fracture, 40 deg, rough, undulating, tight 66.9-66.4" - Fracture zone 66.4-66.8" - Fracture, 70 deg, rough, stepped, tight 66.9" - Fracture, 5 deg, rough, stepped, open 70 70.0  R7-NO 5 ft 69%  1 1 72.4" - Fracture, horizontal, rough, undulating, open 72.4-72.9" - Fracture, 80 deg, rough, stepped, tight 72.9, 73.4" - Fracture, 80 deg, rough, stepped, tight 72.9, 73.4" - Fracture, 80 deg, rough, stepped, tight 72.9, 73.4" - Fracture, 80 deg, rough, stepped, tight 72.9, 73.4" - Fracture, 70 deg, rough, undulating, open 74.1-74.6" - Fracture, 70 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, undulating 75.0" - Fracture, 45 deg, rough, undulating 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, undulating 75.7" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 70 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 70 deg, rough, stepped, tight 75.0" - Fracture, 45 deg, rough, stepped, tight 75.0" - Fracture, 70 deg, rough, stepped, tight 75.0" - Fracture, 70 deg, rough, stepped, tight 75.0" - Fracture, 70 deg, rough, stepped, toght stepped, tight 75.0" - Fracture, 85 deg, rough, stepped, tight 75.0" - Fracture, 70 deg, rough, stepped, toght stepped, tight 75.0" - Fracture, 80 deg, rough, stepped, tight 75.0" - Fracture, 80 deg, rough, st	_		17	1	undulating, open 65.4-65.7' - Fracture, vertical, rough,	片		_
NR  NR  NR  NR  NR  NR  NR  NR  NR  NR	_			-		世		_
R6. 8 minutes  66.4-66.8' - Fracture, 70 deg, rough, stepped, tight 66.9' - Fracture, - 5 deg, rough, stepped, tight 67.8' - Fracture, lorizontal, rough, stepped, open  R7-NQ 5 ft 69%  1	_				tight	世	_ fine to very fine grained, voids	=
To 70.0	-			NR		世		R6: 8 minutes
-28.1						╀		- To. o minutes
NR  NR  NR  NR  NR  NR  NR  NR  NR  NR		70.0		0	67.8' - Fracture, horizontal, rough, stepped,	₽	increasing with depth from weak (R2)	_
No Recovery 67.8-70.0' Limestone 70.0-70.15: Same as 65.0-67.8' No Recovery 70.15-71.75' Limestone 72.4-72.9' - Fracture, 80 deg, rough, stepped, tight 72.9, 73.4' - Fractures (2), 0-10 deg, rough, undulating, itight to open 74.1-74.6' - Fracture, 70 deg, rough, stepped, tight 75.0' - Fracture, 45 deg, rough, undulating 75.7' - Fracture, 45 deg, rough, stepped, open 76.6' - Fracture, 45 deg, rough, stepped, open 77.4.7.9' - Fracture, 45 deg, rough, stepped, open 78.7.7.0' decreasing to 18.20% of surface, several cavities (1/4"x1/2"), most with secondary infill, gradual transition to 78.2-79.5'  77.0' - Fracture, 45 deg, rough, stepped, open 77.5.7' - Fracture, 45 deg, rough, stepped, open 78.7.7' - Fracture, 45 deg, rough, stepped, open 79.7.7' - Fracture, 45 deg, rough, stepped, open 79.7.7' - Fracture, 45 deg, rough, stepped, open 79.7.7' - Fracture, 45 deg, rough, stepped, open 79.7.7' - Fracture, 45 deg, rough, stepped, open 79.7.7' - Fracture, 45 deg, rough, stepped, open 79.7.7' - Fracture, 45 deg, rough, stepped, open 79.7.7' - Fracture, 45 deg, rough, stepped, open 79.7.7' - Fractu	-				open	$\blacksquare$		-
R7-NQ 5 ft 69% 40 3 72.4' - Fracture, horizontal, rough, undulating, open 72.4-72.9' - Fractures (2), 0-10 deg, rough, undulating, tight to open 74.1-74.6' - Fracture, 70 deg, rough, stepped, tight 75.0' - Fracture, 45 deg, rough, undulating 75.0' - Fracture, 45 deg, rough, stepped, tight 75.0' - Fracture, 45 deg, rough, undulating 75.0' - Fracture, 45 deg, rough, stepped, tight 76.6' - Fracture, 45 deg, rough,	-			NK		田		=
R7-NQ 5 ft 69% 40 3 72.4' - Fracture, horizontal, rough, undulating, open 72.4-72.9' - Fracture, 80 deg, rough, stepped, tight 72.9, 73.4' - Fractures (2), 0-10 deg, rough, undulating, tight to open 74.1-74.6' - Fracture, 70 deg, rough, stepped, tight 75.0' - Fracture, 45 deg, rough, undulating 75.0' - Fracture, 45 deg, rough, stepped, open 75.7' - Fracture, 45 deg, rough, stepped, open 76.6' - Fracture, 45 deg, rough, stepped, tight 76.6' - Fracture, 45 deg, rough, stepped, open 76.6' - Fracture, 45 deg, rough, stepped, open 76.6' - Fracture, 45 deg, rough, stepped, open 76.6' - Fracture, horizontal, rough, stepped, tight 76.6' - Fracture, horizontal, rough, stepped, open 76.6' - Fracture, horizontal, rough, stepped, several cavities (I/4"x1/2"), most with secondary infill, gradual transition to 78.2-79.5'				0		$\blacksquare$	Limestone	
69%  1 1			40	-1	70.41 Fractive harizantal revels undulating	oxdappi	No Recovery 70.15-71.75'	
72.4-72.9 - Fracture, 80 deg, rough, stepped, tight 72.9, 73.4' - Fractures (2), 0-10 deg, rough, undulating, tight to open 74.1-74.6' - Fracture, 70 deg, rough, stepped, tight 75.0' - Fracture, 45 deg, rough, undulating 75.0' - Fracture, 45 deg, rough, stepped, open 76.6' - Fracture, horizontal, rough, stepped, tight 78.45, 78.55' - Bedding plane (2), horizontal, smooth, undulating to planar, open 78.45, 78.55' - Bedding plane (2), horizontal, smooth, undulating to planar, open 78.45, 78.55' - Bedding plane, open 78.45, 78.55' - Bedding plane, open 78.45, 78.55' - Bedding plane, open 78.45, 78.55' - Bedding plane, open 78.45, 78.55' - Bedding planar, open 78.45, 78.55' - Bedding planar, open 78.45, 78.55' - Bedding planar, open 78.45, 78.55' - Bedding planar, open	_		70		open	耳		_
72.9, 73.4' - Fractures (2), 0-10 deg, rough, undulating, tight to open 74.1-74.6' - Fracture, 70 deg, rough, stepped, tight 75.0' - Fracture, 45 deg, rough, undulating 75.7' - Fracture, <5 deg, rough, stepped, open 75.7' - Fracture, <5 deg, rough, stepped, open 76.6' - Fracture, horizontal, rough, stepped, tight 76.6' - Fracture, horizontal, rough, stepped, open 78.8-NQ 5 ft 1000% 86 0 3 78.45, 78.55' - Bedding plane (2), horizontal, smooth, undulating to planar, open	-			1		H	yellow, (5Y 7/2 to 5Y 6/4), fine	-
75 75.0  75 75.0  75 75.0  77 75.0  77 75.0  78 75.0  78 75.0  79	-				72.9, 73.4' - Fractures (2), 0-10 deg, rough,	世	<ul> <li>medium strong (R3), voids (up to</li> </ul>	R7: 7 minutes
tight 75.0' - Fracture, 45 deg, rough, undulating 75.0' - Fracture, 45 deg, rough, undulating 75.0' - Fracture, 45 deg, rough, stepped, open 75.7' - Fracture, 45 deg, rough, stepped, open 75.0-78.2' - Same as 71.75-75.0' except voids below 77.0' decreasing to 18-20% of surface, few elongated cavities (1/4"x1/2"), most with secondary infill, gradual transition to 78.2-79.5'  78.45, 78.55' - Bedding plane (2), horizontal, smooth, undulating to planar, open	<b>-</b>	75.0		2	74.1-74.6 - Fracture, 70 deg, rough, stepped,	坩		-
R8-NQ 5 ft 100% 86 0 3 78.45, 78.55' - Bedding plane (2), horizontal, smooth, undulating to planar, open		75.0		$\dashv$		世	— 1-3% of surface predominantly at	_
open 76.6' - Fracture, horizontal, rough, stepped, tight  R8-NQ 5 ft 100%  3 78.45, 78.55' - Bedding plane (2), horizontal, smooth, undulating to planar, open	-			1		世	75.0-78.2' - Same as 71.75-75.0'	-
R8-NQ 5 ft 100% 3 78.45, 78.55' - Bedding plane (2), horizontal, smooth, undulating to planar, open					, 0, 0, 11	世	to 18-20% of surface, few elongated	
R8-NQ 5 ft 100% 86 0 3 78.45, 78.55' - Bedding plane (2), horizontal, smooth, undulating to planar, open				1		Ш		
100%  3 78.45, 78.55' - Bedding plane (2), horizontal, smooth, undulating to planar, open			86	0	tight	Ы		
smooth, undulating to planar, open	_		50			$oxed{\Box}$	-	_
smooth, undulating to planar, open	-			3	78 45 78 55' - Redding plane (2) horizontal	$\blacksquare$	-	-
	-			$\dashv$	smooth, undulating to planar, open	Ħ	_	R8: 5 minutes
1 undulating open	-			1		卄	-	-
80 80.0	80	80.0		$\dashv$		Ħ		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

D-04

SHEET 5 OF 5

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723150.5 N, 457831.9 E (NAD83)

ELEVATION: 41.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	ft bgs	s on 3/	28/07 START : 3/28/2007 END : 4/	4/2007	LOGGER : R. McComb	
≥D₽	(%			DISCONTINUITIES	စ္က	LITHOLOGY	COMMENTS
BELO CE AN	RUN, 'H, AND ÆRY (9	(%)	URES OOT	DESCRIPTION POLICIANESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMB0	WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-38.1 -			>10	80.0-81.1' - Fractures, 0-90 deg, rough, undulating and stepped, open	Ħ	78.2 - 79.5' - pale yellowish orange to moderate yellow, (10YR 8/6 to 5Y	-
_			_			7/6), fine grained, strong HCI reaction, extremely weak to very weak (R0 to R1), dark gray 1/8"	<u> </u>
-	R9-NQ		0		H	gravel in matrix from 78.5-79.0', 5-10% voids from 78.5-79.0'	-
-	5 ft 46%	0			$\vdash$	declining to 0% at 79.0', gradual transition to 79.5-80.0'	-
-			NR		Ħ	79.5-80.0' - pale yellowish orange, (10YR 8/6), fine grained, strong HCl reaction, very weak (R1), voids	-
-					Ħ	(1/16") over 18% of surface, homogeneous appearance	R9: 7 minutes
85 <u> </u>	85.0			_	#	80.0-80.9' - light olive brown, (5Y 5/6), very fine to fine grained, mild	_
-			1	85.95' - Fracture, <5 deg, rough, undulating,	Ħ	HCI reaction, extremely weak (R0), voids over 30-40% of surface grading into cavities up to 3/8",	_
-			1	open 86.6' - Fracture, <5 deg, rough, undulating,	Ħ	gravel-sized material  Limey Clay (CL)	-
_	R10-NQ 5 ft	59	2	tight 87.2' - Fracture, 30-40 deg, rough,		80.9-81.1' - moderate olive brown, (5Y 4/4), moist, soft, low plasticity,	Driller's Remark: Lost circulation at 87.0'
_	98%		2	undulating, open 87.4-87.7' - Fracture zone, 60 deg, rough, undulating, tight	H	black carbonaceous staining, silty Limestone - 81.1-82.3' - Same as 80.0-80.9'	-
-				88.45-88.7' - Fracture zone, <5-60 deg, rough, undulating, open	H	except weak (R2), not broken into gravel-sized rock fragments	R10: 9 minutes
90	90.0		2 NR	89.55' - Fracture, horizontal, rough, stepped, open	Ħ	No Recovery 82.3-85.0' Limestone	_
-48.1 -			>10	89.7' - Fracture, 80-90 deg, rough, undulating, open		85.0-89.9' - moderate yellowish - brown to yellowish gray with depth, (10Y 5/4 to 5Y 7/2), mild to strong	-
_				90.0-90.8 - Fracture zone, various orientations	H	HCl reaction, weak to medium strong (R2 to R3), voids covering 15-40% of	-
-	R11-NQ				Ħ	surface grading into cavities (up to 1-3/16") with depth, mottled with zones of light limestone becoming	-
_	5 ft 16%	0	NR			more fossiliferous with depth  No Recovery 89.9-90.0'	_
-					Ħ	Limestone 90.0-90.8' - light olive brown to dusky	_
	05.0				H	yellow, (5Y 5/6 to 5Y 6/4), strong HCl reaction, weak (R2), voids over 20-30% of surface, gravel-sized rock	R11: 5 minutes
95 -53.1 -	95.0			_	囯	fragments (1/4"-2"), highly fossiliferous, black carbonaceous	Driller's Remark: Possible void 95.0 - 96.0'; very soft -
_					甘	material up to 15-20% of surface No Recovery 90.8-98.5'	drilling 96.0 - 98.5', firmer drilling at 98.5'
-	B40 1:0		NR		Ħ	- -	_
-	R12-NQ 5 ft 30%	6			H	Limestone	-
-			>10			<ul> <li>98.5-100.0' - dusky yellow, (5Y 6/4),</li> <li>strong HCl reaction, weak (R2),</li> <li>gravel-sized rock fragments, voids</li> </ul>	_
-			>10	99.0-100.0' - Fracture zone, 0-90 deg, rough,	Ħ	- covering 25-40% of surface, highly fossiliferous	R12: 3 minutes
100	100.0		>10	undulating, open	H	Bottom of Boring at 100.0 ft bgs on	
						4/4/2007	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-05	SHEET	1	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723221.4 N, 457903.2 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

						ry, auto nammer, Avvu rous, s			ORIENTATION : VEItical
WATER	LEVELS	: 2.0 ft bo	gs on 04/0	04/07	START : 4/4/2007	END: 4/4/2007	LOGGEF	R : A.	Teal
				STANDARD		SOIL DESCRIPTION		(D	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	J (ft)	PENETRATION				SYMBOLIC LOG	
SEE	07 11111 E.E.			TEST RESULTS	SOIL NAMI	IE, USCS GROUP SYMBOL, (	COLOR	$\overline{\circ}$	DEPTH OF CASING, DRILLING RATE,
A SE		RECOVE	ERY (ft)			CONTENT, RELATIVE DEN		g	DRILLING FLUID LOSS, TESTS, AND
FF			#TYPE	6"-6"-6"		ICY, SOIL STRUCTURE, MINE		MB	INSTRUMENTATION
SUI			"	(N)				SΥ	
41.8	0.0				_ Topsoil (OL)			7/1/	Water level: 2.0' below ground surface
-	***			0-0-2		x, (N1), organics	/-		-
l _		0.8	SS-1	(2)	Poorly Graded	Sand With Organics (SP)			_
	1.5			( )	\ 0.3-0.8' - browr	nish gray, (5YR 4/1), moist,	very loose,		
-	1.0				very fine to fine	e grained, no HCl reaction, s	silica sand, 📗	1	-
-						ic fines, 20% organics as fin	es and   _	1	=
					roots				
-	1						-	1	=
_							-		=
1 7	]						=	1	1
-	1						-	1	-
5	5.0					. (01)		<b>,</b> ,,,	
36.8					Sandy Lean Cl	lay (CL)			Weight of hammer for last 12"
1 7	]	1.3	SS-2	1-0-0		enish gray, (5G 6/1), moist to dium plasticity, slow to rapid		V///	1
-	1			(0)	35-40% very fir		i ullatarity, _	<b>\</b> ///	−
_	6.5				00 70 /0 VCI Y III	no onioù ouriù		<b>I</b> '''	
_	1						-	1	
-	-						-	1	-
_	[						_	1	_
-	1						-	1	-
-	-						-	ł	=
							_		
10	10.0								
31.8	10.0				Silty Sand (SM	<b>/</b> /\		111	Appears to have fossil fragments
				13-14-22		llowish gray, (5Y 8/1), moist	to wet		
		1.4	SS-3	(36)	dense, very fine	e to coarse grained, low pla	sticity, very	$\mathbf{H}$	Driller's Remark: Lost circulation at 12'
_	11.5			(00)		, strong HCI reaction, 20-25	% low	1	
-	11.5				¬plastic trace fin	nes gravel-sized		Т	-
_							=		_
1 7	]						=	1	1
-	1						-	1	=
-							-	1	_
]	1						-	1	1
-	1						-	1	-
15	15.0							<b>I</b>	_
26.8					Silt (ML)	1 ( 11 (=)(=)(=)			
-	1	1.0	SS-4	1-4-26	15.0-15.8' - mo	oderate yellow, (5Y 7/6), wet	t, very stiff,	Ш	7
-	-		55 -	(30)	reaction 10 15	id dilatancy, moderate to str 5% very fine sand-sized, car	bonate	H	-
_	16.5				materials	70 very mie same-sizeu, Cal	DOI IAIC	1	
					Limestone Fra	arments	/		Set 20' HW casing
-	1				15 8-16 0' - mo	oderate olive brown, (5Y 4/4	) strong / -	1	-
-					HCl reaction. fi	ine to coarse gravel-sized	,, sasing   -	1	-
I 7							_		]
-	1						-	1	-
-							-	1	-
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20							_		]
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-05	SHEET	2	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723221.4 N, 457903.2 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 2.0 ft b	gs on 04/0	04/07	START : 4/4/2007 END : 4/4/2007 LOGGER : A. Teal
>00				STANDARD	SOIL DESCRIPTION COMMENTS
N AN C	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE			MOISTURE CONTENT, TEXTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
21.8	20.8	0.1	SS-5	50/3	Limestone Fragments
				(50/3")	20.0-20.3' - grayish yellow, (5Y 8/4), fine to coarse grained, mild HCl reaction, fine gravel-sized
l _					\fragments
_					<b>.</b> .
-					<b>-</b>
-	-				
-	-				<b>-</b>
-					
25	25.0				<b> </b>
16.8	25.0				Sandy Silt With Limestone (ML)
-		1.1	SS-6	17-26-31 (57)	25.0-26.1' - grayish yellow, (5Y 8/4), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 10%
	26.5			(0.)	fine to coarse limestone fragments, 35-40% fine to coarse sand-sized, carbonate materials
_					Codise sand sized, carbonate materials
-					<b> </b>
-					<b>-                                     </b>
-					-
-	-				-
30	30.0				<b> </b>
11.8	30.0				Sandy Silt (ML)
_	1	1.5	SS-7	15-17-47 (64)	30.0-31.5' - Same as 25.0-26.1' except mild to moderate HCl reaction, 30% fine to coarse
	31.5			(04)	sand-sized, trace gravel-sized
_					<b></b>
_					<b> </b>
-					<b>-                                     </b>
-					<b>-                                    </b>
-					
35	35.0				<b> </b>
6.8	00.0			34-24-50/2.5	Sandy Silt With Limestone (ML)
	200	1.1	SS-8	(74/8.5")	35.0-36.1' - light olive gray, (5Y 5/2), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 40%
	36.2				fine to coarse sand-sized, 10% fine to coarse gravel-sized limestone fragments, carbonate
_					materials
-	-				] ]
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-05	SHEET	3	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723221.4 N, 457903.2 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

						ary, auto nammer, AvvJ rous,				ORIENTATION : Vertical
WATER	LEVELS	. 2.0 ft b	us on 04/0		START : 4/4/2007	END : 4/4/2007	LOGO	: K∃و <b>ا</b>	: A.	
≥∩≎				STANDARD		SOIL DESCRIPTION		_	ဗ္	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS	COU NAME	AE LICOS ODOUB OVAROU	001.00		SYMBOLIC LOG	DEDTIL OF CACINIC POIL INC DATE
H H H		RECOVE	ERY (ft)		SUIL NAM MOISTURI	ME, USCS GROUP SYMBOL, E CONTENT, RELATIVE DEI	NSITY OR		P.	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EF.			#TYPE	6"-6"-6"	CONSISTEN	NCY, SOIL STRUCTURE, MI	NERALOGY		MB	INSTRUMENTATION
BS급				(N)					S)	
1.8	40.6	0.3	SS-9	50/4	Limestone Fra	agments	4	$\mathcal{A}$	Щ	
				(50/4")	grained, mild h	ght olive gray, (5Y 5/2), fine HCl reaction	to coarse	/A		_
I -					Begin Rock Co	oring at 40.7 ft bgs		<b>7</b> 1		-
-					See the next s	sheet for the rock core log		- 1		<del>-</del>
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-05	SHEET	4	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723221.4 N, 457903.2 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS: 2.0	ft bgs	s on 04	4/04/07 START : 4/4/2007 END : 4/	4/200	7 LOGGER : A. Teal	
≥0₽	- (°			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
AACE	S.E.P.	(%) O	F.0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	) SOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FR EV	ORE	RQD	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ОΩШ		œ	╙┺	THIORNESS, SON ACE STAINING, AND HOTTINESS	S		D4: 4 minute
-	40.7 R1-NQ 1 ft	50	3	40.9' - Fracture, 10 deg, smooth, undulating,	Ш	Limestone 40.7-41.7' - pale yellowish brown,	R1: 1 minute
-	41.7 85%			tight 41.0' - Fracture, 50 deg, smooth, planar, tight	₩	(10YR 6/2), fine grained, moderate	1
-			0	41.05' - Fracture, 10 deg, smooth, undulating,	口	HCl reaction, weak (R2), 10-20% void space up to 1/8", trace cavities	1
-				loose	Ш	up to 1/4", moderately fossiliferous	1
_			5		+	(casts/molds) 41.7-43.5' - pale yellowish brown,	
-				43.2' - Mechanical break 43.5-44.5' - Fracture zone (at least 7), tight	H	<ul> <li>(10YR 6/2), fine grained, delayed</li> </ul>	1
_	R2-NQ	25	- 10	but weathered fractures with fragmentation	Ш	moderate HCl reaction, weak to medium strong (R2 to R3), 15-20%	1 -
_	5 ft 88%	35	>10	44 E 45 7' Fracture zone fragmente fram	Н	<ul> <li>voids up to 1/8", trace cavities up to</li> </ul>	-
45				44.5-45.7' - Fracture zone, fragments from 1/8" to 1", subrounded —	ш	3/16", moderately fossiliferous	_
-3.2			>10		Ш	(molds/casts) - 43.5-46.1' - pale yellowish brown,	_
_			>10	45.7-46.1' - Fractures (at least 4), 10 deg,	$\Box$	(10YR 6/2), fine grained, strong HCI	R2: 2 minutes
_	46.7		NR	open, weathered, with vertical fractures and fragmentation	Ħ	reaction, extremely weak to very weak (R0 to R1), 10% void space up	_
l _	40.7			46.7-50.3' - Fracture zone, very soft material		to 1/8", poorly fossiliferous	
			>10		Ш	No Recovery 46.1-46.7' Limestone	
					ш	46.7-50.3' - pale yellowish brown,	1
_			>10		Т	(10YR 6/2), fine grained, moderate  HCl reaction, extremely weak to very	1
_	R3-NQ				Ħ	weak (R0 to R1), 20-30% voids,	1
_	5 ft	45	>10			trace up to 1/3" long fossil cavities and casts	1
50	70%				╁		1
-8.2			>10	_	ш	_	1
-					ш	No Recovery 50.5-51.7'	R3: 1 minute
-			NR		Ш	-	R3. I Illillute
-	51.7				+	L::	1
-			>10	52.0' - Fracture, 10 deg, rough, undulating,	廿	Limestone 51.7-53.8' - pale yellowish brown,	1
-				tight		(10YR 6/2), fine grained, moderate	1
-			>10	52.3-53.0' - Fracture zone, limestone fragments from silt to cobble-sized fragments	₩	HCl reaction, very weak to weak (R1 to R2), 10-20% voids up to 1/16"	1
-			0		口	-	1
-	R4-NQ 5 ft	75	>10	53.8' - Fracture, 20 deg, rough, undulating,	╂╥	- 53.8-56.0' - Same as 51.7-53.8'	1
-	86%	75	/10	loose 54.1' - Fracture, 25 deg, rough, undulating,	$\blacksquare$	except moderate yellowish brown, (10YR 5/4)	1 -
55 <u> </u>				tight		— (1811( 8/1)	1 -
-10.2			0	54.2-54.7' - Fracture zone, 20 deg, same as 52.3-53.0'	Ш	_	1
-			0	55.5' - Mechanical break	尸	No Bosoveni FG 0 FC 7	R4: 2 minutes
_	56.7		NR		Щ	No Recovery 56.0-56.7'	
_					Ш	Limestone	
_			0		H	56.7-61.3' - pale yellowish brown, (10YR 6/2), fine grained, moderate	]
I -				57.0' Fracture 20 dec rough undulating	H	HCl reaction, very weak to weak (R1	]
			1	57.9' - Fracture, 30 deg, rough, undulating, tight	Н	to R2), 20-25% voids up to 1/8", some laminations	]
	R5-NQ			·	Щ		]
	5 ft	68	>10	59.2' - Fracture, 70 deg, rough, undulating,	Ш		1
60	92%			tight	Ы		1
-18.2			>10	59.5-60.3' - Fracture zone, gravel-sized — fragments	$\sqcap$		7
					Ħ		
			1		1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-05	SHEET	5	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723221.4 N, 457903.2 E (NAD83)

ELEVATION: 41.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.0	ft bgs	s on 04	4/04/07 START : 4/4/2007	END : 4/4	/200	7 LOGGER : A. Teal	
≥ ∩ ∷	(9)			DISCONTINUITIES		ပ္	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE ATIO	: RUI TH./	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROU	GHNESS.	OLIC O	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND
EV.	ORE	ØΒ	RAC ER F	PLANARITÝ, INFILLING MATERIA THICKNESS, SURFACE STAINING, AND	AL AND	ΥMΒ	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	038	22				Ś		
-			1	60.5' - Fracture, 45 deg, rough, und tight	_		_ Limestone 60.0-60.3' - dark yellowish brown,	R5: 3 minutes _
-	61.7		NR	60.9' - Fracture, horizontal, smooth	, planar,	H	(10YR 4/2), fine grained, mild HCl	-
-				tight	/ -	l	reaction, extremely weak (R0) 60.9-61.0' - Same as 60.0-60.3'	End of boring _
-					-	ł	- \61.0-61.3' - Same as 56.7-61.3'	-
-					-	ł	No Recovery 61.3-61.7' Bottom of Boring at 61.7 ft bgs on	-
-					-		- 4/4/2007	-
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PROJECT NUMBER:	BORING NUMBER:					_
338884.FL	D-06	SHEET	1	OF	4	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723292.3 N, 457976.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

						y, auto riammer, AVVJ rous,			ORIENTATION : Vertical
WATER	LEVELS	: 2.1 ft b	us on 4/2		START : 4/23/2007	END: 4/24/2007 SOIL DESCRIPTION	LUGGEF	₹∶Ν. 	Jarzyniecki COMMENTS
≥¤≎				STANDARD PENETRATION		SOIL DESCRIPTION		ဗ္ဂ	COIVIIVIEN 15
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOIL NAME	E, USCS GROUP SYMBOL,	COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
ACE		RECOVE	ERY (ft)		MOISTURE	CONTENT, RELATIVE DEI	NSITY OR	ğ	DRILLING FLUID LOSS, TESTS, AND
무유실			#TYPE	6"-6"-6"	CONSISTENC	CY, SOIL STRUCTURE, MIN	NERALOGY	×ΜΕ	INSTRUMENTATION
<u> </u>	0.0			(N)	Silty Sand (SM)	`		S	
41.0	0.0			1-1-1	0.0-0.5' - moder	<i>)</i> rate yellowish brown to oli	ive gray,	Ш	-
_		0.5	SS-1	(2)	\ (10YR 5/4 to 5Y	(3/2), moist to wet, very le	oose, fine	1	_
l _	1.5				grained, no HCI fines, mostly or	I reaction, silica sand, 159	% nonplastic	]	
					lines, mostly org	garile iiries			
							-	1	1
_							-	1	1
-							-	1	1
-							-	1	-
							-	1	-
5 36.6	5.0				Sandy Fat Clay	(CH)		///	-
-		1.1	SS-2	2-2-1	5.0-6.1' - pale b	olue, (5PB 7/2), moist, sof			-
-		1.1	33-2	(3)	high plasticity, no very fine to fine	no dilatancy, no HCl react	ion, 35-40%		-
_	6.5				very fine to fine	Silica Saria		-	-
_							-	1	_
_							-		_
_							_	1	_
_							_		
-							-	1	1
10	10.0						-	1	1
31.6	10.0				¬ Limestone Fra		Γ	<b>.</b>	Driller's Remark: Stiff at 9.0'
-		1.1	SS-3	11-24-40		sky yellow, (5Y 6/4), fine to HCl reaction, gravel-size		1	-
-	11 5			(64)	Silt (ML)	Tici reaction, graver-size	u iraginents	ш	-
-	11.5				\ 10.2-11.1' - dus	sky yellow, (5Y 6/4), moist	, hard,	┨	-
-						d dilatancy, mild to moder very fine carbonate sand		┨	-
_					reaction, 5-1070	very line carbonate same	·	ł	-
-							-	1	-
-							-	1	_
-							-	1	_
-							-	1	_
15	15.0							<u> </u>	
26.6				00 50/5 55	Sandy Silt (ML)	<b>)</b> e yellowish brown, (10YR	6/2) moist		07:38 water level at 2.1' below ground surface
		1.5	SS-4	22-50/5.75 (72/11.75")	very stiff, low pla	asticity, rapid dilatancy, m	noderate HCl		Surface
	16.5			( )	reaction, 25% fi	ine grained sand, some a	ppears as	$\prod$	Driller's Remark: 08:00 borehole caved in
					limestone at 16.	slough), trace fine gravel .0', trace organics, primar	-sizeu ily carbonate //	Π	over night; 15.0-16.0' may include slough - accounting for the discrepancy between
1 -					Silt (ML)	•	·   -	1	depth of penetration and recovery length
-					16.0-16.5' - yello	owish gray, (5Y 5/2), mois	st, hard,	1	1
-						very fine grained sand	- 1101	1	
-								1	
-							-	1	-
							-	1	-
20								$\vdash$	
1									
			l						



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	D-06	SHEET	2	OF	4

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723292.3 N, 457976.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS	: 2.1 ft bo	gs on 4/23	3/07	START : 4/23/2007 END : 4/24/2007 LOGGER : N. Jarzyniecki
300				STANDARD	SOIL DESCRIPTION COMMENTS
N N N	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR  DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
21.6	20.0			. ,	Silty Sand And Limestone (SM)
-		0.8	SS-5	21-29-3 (32)	20.0-20.8' - very pale orange, (10YR 8/2), moist, dense, fine to coarse grained, moderate HCl reaction,
-	21.5			(02)	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
					lines, carbonate
_					
-					<b>.</b>
-	-				
-					
25	25.0				
16.6	25.0				Silty Sand With Limestone (SM)
-	-	0.6	SS-6	20-8-1 (9)	25.0-25.6' - grayish orange, (10ÝR 6/4), moist, loose, fine to coarse grained, moderate HCl reaction, similar
-	26.5			(9)	to 20.0-20.8', 25% fine to coarse gravel-sized   -
					materials
_					
-					
-					
-					-
30 11.6	30.0				Sandy Silt (ML) 08:15 Begin drilling to 35.0'
-	-	1.4	SS-7	6-9-15	30.0-31.4' - dusky yellow, (5Y 6/4), wet, very stiff, low plasticity, rapid dilatancy, mild to moderate HCl During drilling to 35.0' lost circulation at 8:21
-	31.5			(24)	reaction, 35-40% fine to coarse sand, carbonate             - lots of chatter during drilling
-					materials
					]
_					
-					<b>.</b>
-					
					-
35 6.6	35.0 35.2	0.0	SS-8	50/2	No Recovery 35.0-35.2'  Casing advanced to 35.0' below ground
-	1			(50/2")	- surface -
-	1				Begin Rock Coring at 36.0 ft bgs
	]				See the next sheet for the rock core log
					]
-	1				<b>                                   </b>
-	-				
-	-				-
	-				4
40					+ +



PROJECT NUMBER:	BORING NUMBER:					-
338884.FL	D-06	SHEET	3	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723292.3 N, 457976.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS : 2.1	ft bgs	s on 4/	23/07 START : 4/23/2007 END : 4/2	24/200	D7 LOGGER : N. Jarzyniecki	_
≳□£	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
TH B FACI	E RU GTH, OVE	R Q D (%)	FOCT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOL	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR LEN REC	RO	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	36.0				ш	Limestone	10:04 Begin coring R1-NQ
_			1	36.7, 37.7' - Mechanical break (2)	ш	<ul> <li>36.0-39.15' - pale olive to light olive gray, (10Y 6/2 to 5Y 5/2), very fine to</li> </ul>	-
			2	36.9 - Bedding plane, <10 deg, rough,		fine grained, strong HCl reaction, fossiliferous, fossil casts, voids over	
				undulating, tight 37.0' - Fracture, 50 deg, rough, undulating,		20% of surface, up to 1/16" trace	
_	R1-NQ 5 ft	47	5	tight 37.05' - Fracture, 10-25 deg, rough,	$\vdash$	dissolution, trace organic features, at 36.7' weak (R2), at 37.7' very weak	_
_	84%	.,		undulating, tight	H	to weak (R1-R2)	_
_			0	38.0-38.3 - Fracture zone, rough, undulating, intersecting bedding plane and high angle	H	39.15-40.2' - moderate olive brown, (5Y 4/4), moderate HCl reaction,	_
40 1.6				fractures, tight 38.5' - Bedding plane, same as 36.9' except		— extremely weak (R0), laminar	R1: 9 minutes
- 1.0			NR	open up to 1/2"	岸	features of olive gray (5Y3/2) No Recovery 40.2-41.0'	K1. 9 minutes
-	41.0			-	H	Limestone	-
-			0	-	Ш	- 41.0-41.85' - Same as 39.15-40.2'	-
-				-	Н	except strong HCl reaction 41.85-44.6' - light olive gray to dusky	-
_			1	42.3' - Fracture, 80 deg, rough, undulating, - tight	Н	<ul> <li>yellow with pale olive infill, (5Y 5/2 to 5Y 6/4 with 10Y 6/2), strong HCI</li> </ul>	-
_	R2-NQ			-	H	reaction, very weak to weak (R1 to	-
_	5 ft 73%	47	1	43.5-43.8' - Mechanical break	Ш	<ul> <li>R2), voids (up to 1/16") over 30% of surface, moderately fossiliferous,</li> </ul>	_
			1	43.8, 44.1' - Bedding plane (2), 30 deg, rough, undulating, tight		fossil casts up to 1/8" to 1/2", trace organics, very similar to 36.0-39.15'	-
45				<u> </u>	Ш	44.6-44.65' - Same as 39.15-40.2'	-
-3.4			NR			except strong HCl reaction No Recovery 44.65-46.0'	R2: 6 minutes
_	46.0			_		_	_
_			0	_	H	Limestone - 46.0-46.3' - dusky yellow to moderate	_
_				<u>-</u>	F	olive brown, (5Y 6/4 to 5Y 4/4), fine grained, mild HCl reaction, extremely	_
_			2	47.15' - Fracture, 50 deg, rough, undulating, tight		<ul><li>weak (R0), voids (&lt;1/16") over &lt;5%</li></ul>	-
_	R3-NQ			47.55' - Bedding plane, <10 deg, rough,	Ħ	of surface, trace very fine organics, few organic inclusions up to 1/2",	-
_	5 ft	43	1	undulating, open 1/4" 48.15' - Bedding plane, <5 deg, rough,	壯	<ul> <li>very similar to overlying extremely</li> </ul>	_
-	90%			undulating, tight	H	weak rock (39.15'-40.2') 46.3-48.15' - dusky yellow to	-
- FO			2	tight	Ш	<ul> <li>moderate olive brown, (5Y 6/4 to 5Y 4/4), moderate to strong HCI</li> </ul>	-
50 -8.4			-	49.7' - Fracture, 50 deg, rough, undulating, — tight	Н	reaction, medium strong (R3), 25%	R3: 3 minutes
-	51.0		NR	50.25' - Fracture, same as 49.0'	幵	<ul> <li>fine voids predominantly &lt;1/16", moderately fossiliferous, no longer</li> </ul>	-
				-	Ш	cavities, trace organics	-
			0	<u> </u>	Ш	<ul><li>48.15-49.0' - Same as 46.0-46.3'</li><li>49.0-50.35' - Same as 46.3-48.15'</li></ul>	-
			2		Ш	50.35-50.5' - Same as 46.0-46.3' No Recovery 50.5-51.0'	_
				52.5' - Bedding plane, <5 deg, smooth, undulating, tight	口	Limestone	]
	R4-NQ 5 ft	17	1	52.6' - Fracture, 70 deg, rough, undulating,	Ы	51.0-52.1' - Same as 46.0-46.3'	]
_	100%	.,		open 1/8" 53.4' - Fracture, 50 deg, same as 52.6'		_	_
_			1	53.5' - same as 47.55'	$\Box$	_	_
55_ -13.4				54.35' - Mechanical break, same as 48.15' —	H	<u> </u>	D4: 26 minutes
-13.4			0	-	H	_	R4: 26 minutes
-	56.0				H		-
					•		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-06	SHEET	4	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723292.3 N, 457976.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

CORING METHOD AND EQUIPMENT : CME 55 S/N 316625, mud rotary, NQ tools, HW casing

WATER	LEVELS : 2.1	ft bgs	s on 4/	23/07 START : 4/23/2007 END : 4/	24/20	007	LOGGER : N. Jarzyniecki	
≥o.⊋	(%			DISCONTINUITIES	၂ ဗွ		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURF ELEV	CORE	RQD	FRAC PER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME		AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-			2	56.4' - Fracture, 50 deg, undulating, tight 56.8' - Bedding plane, <5 deg, 4" infilling of	Ħ	<u> </u>	52.1-54.3' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, strong HCI reaction,	-
-			1	silt, tight 57.5' - Fracture, same as 56.4'	H	† t	medium strong (R3), but weaker near transitions to over and underlying rock, voids (1/16") over 15-25% of	-
-	R5-NQ 5 ft 92%	48	1	58.8' - Bedding plane, same as 56.8, except		}	surface, moderately fossiliferous with casts and molds up to 1/4", trace organics	-
60	61.0		0	6" thick silt infill	Ħ	- 5	54.3-56.0' - Same as 46.0-46.3' 56.0-56.2' - dusky yellow to moderate blive brown, (5Y 6/4 to 5Y 4/4), fine	-
-18. <del>4</del> -			1 NR	60.3' - Bedding plane, smooth, planar, open up to 1/8"		J⊢ v	grained, mild HCl reaction, extremely weak (R0), voids over <5% of surface, non-fossiliferous, gradual	R5: 18 minutes
-			0	61.2' - Mechanical break	H	-  -  -  -  -  -	transitions to over and underlaying ayers 56.2-56.6' - Same as 52.1-54.3'	-
-			3	62.0, 62.25' - Bedding plane (2), <5 deg, smooth, undulating 62.6' - same as 62.0', except 10 deg		- 5	except a couple of 1/2" cavities 56.6-57.0' - Same as 56.0-56.2' 57.0-58.5' - Same as 52.1-54.3'	-
_	R6-NQ 5 ft 99%	50	1	62.9' - same as 62.0' 63.5' - Bedding plane, 5 deg, smooth, undulating, open up to 1/4"	H	- 5 5	58.5-59.1' - Same as 56.0-56.2' 59.1-60.6' - light olive gray to dusky yellow, (5Y 5/2 to 5Y 6/4), very fine	-
65			>10	64.1-64.4' - Fracture zone		- (  -	grained, strong HCl reaction, strong (R4), voids over <5% of surface, few nfilled cavities (1/16") that are only	-
-23.4	66.0		2	65.0, 65.55' - Fractures (2), 80 deg, rough to smooth, undulating 65.8, 66.9' - Mechanical break (2)	Ħ	] ( 	visible because of increased voids (10%) in infill No Recovery 60.6-61.0'	R6: 14 minutes
-			(NR) 0	05.0, 00.9 - Ivieci iai iicai bieak (2)	Ē	1 6	Limestone 61.0-61.2' - Same as 56.0-56.2' 61.2-62.0' - yellowish gray to dusky	
-		92	1	67.45' - Bedding plane, 30 deg, open up to 1"			yellow, (5Y 7/2 to 5Y 6/4), very fine grained, moderate HCl reaction, strong to very strong (R4 to R5), voids (1/16") over 5% of surface, no	
-	R7-NQ 5 ft 96%				68.4' - Bedding plane, smooth, undulating, open <1/8", associated with organic		+ 6	coavities, 1/2" thick laminations / infill of light olive gray (5Y 5/2) with no voids
70 <u> </u>			0	lamination 68.5, 69.4, 70.6' - Mechanical break (3)	H	1 6	62.0-62.9' - Same as 56.0-56.2' 62.9-64.1' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine	_
-28. <del>4</del> -	71.0		1 NR	70.3' - Bedding plane, 10 deg	Ē	-	grained, moderate to strong HCl reaction, weak to strong (R2 to R4), gradual transition from bounding	R7: 9 minutes
-							weak (R2) rock, voids (1/16") over 10-30% of surface 64.1-64.8' - Same as 56.0-56.2'	13:15 Total depth of hole at 71.0' Note: Used 9 bags of
-							64.8-65.95' - Same as 62.9-64.1' No Recovery 65.95-66.0' Limestone	cement (47-lb bags) and 40 gallons of water
-							66.0-67.7' - dark yellowish orange to yellowish gray, (10YR 6/6 to 5Y 7/2), swirled / mottled, very fine grained,	
-							strong HCl reaction, very strong (R5), voids (1/16") over 0-10% of surface	_

ORIENTATION: Vertical



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	D-06	SHEET	5	OF	5	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723292.3 N, 457976.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: D. Buchler

WATER	LEVELS: 2.	1 ft bgs	s on 4/	/23/07 START : 4/23/2007	END : 4/2	4/200	7 LOGGER : N. Jarzyniecki	
300	~			DISCONTINUITIES		ני	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)		SII	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE: COLOR:	OUTE AND DEDTIL OF CASH
ᆱᇰᅙ	Z X X	(%) Q	URE			CIC	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
PTH EVA	RE F SOV	) <u>a</u> «	ACT R FC	DEPTH, TYPE, ORIENTATION, ROUG PLANARITY, INFILLING MATERIAL	_ AND	MBC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SCIE	SHR	A Q	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND	TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
						H	67.7-69.7' - moderate yellowish	
-					=		brown, (10Y 5/4), very fine grained,	-
-					_		strong HCl reaction, very weak to weak (R1 to R2), voids (1/16") over	_
-					_		- 5% of surface, 1/4" cavities at 68.6',	_
					_		weak (R2) rock at 68.5' and 69.4' 69.7-70.8' - Same as 67.7-69.7'	_
							69.7-70.8' - Same as 67.7-69.7' - except increased variability in voids	
							from 5-30%, alternating very weak	
					-		(R1) rock to medium strong (R3)	1
					=		rock No Recovery 70.8-71.0'	-
-					_		Bottom of Boring at 71.0 ft bgs on	_
-					=	ŀ	- 4/24/2007	-
-					-		-	-
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-01	SHEET	1	OF	13

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

						auto nammer, Avvo rous,			ORIENTATION : Vertical
WATER	LEVELS	: 3.2 ft bo	gs on 5/30	0/07 S	TART : 5/30/2007	END : 6/3/2007	LOGGE	₹ : B.	
≥∩≎				STANDARD	S	OIL DESCRIPTION		g ا	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	E INTERVAL (ft) PENETRATION TEST RESULTS			COIL NAME LIS	CCC CDOLID CVMDOL (	COL OR	SYMBOLIC LOG	DEDTIL OF CASING DOULING DATE
		RECOVERY (ft)				SCS GROUP SYMBOL, C NTENT, RELATIVE DENS		9	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
FF FF			#TYPE	6"-6"-6"		SOIL STRUCTURE, MINE		MB	INSTRUMENTATION
ESE ESE				(N)					
40.9	0.0			4.0.0	<b>Topsoil</b> _\0.0-0.3' - black, (N8	R) organice	/.	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Start drilling at 16:00 on 5/30/07 Water table encountered at 3.2' below -
		0.8	SS-1	1-2-3 (5)	Silty Sand (SM)	o), organics		114:	ground surface
	1.5			(0)	0.3-0.75' - light brov	wn to moderate brown,		1	Šilica sand
-						ose, very fine to fine gra	ined, 15%	1	=
-					nonplastic fines, 5-	10% organics		1	-
-							-	┨	-
-							-	1	-
_								1	_
_									_
_								1	_
5	5.0								
35.9					Silty Sand (SM)	noderate yellowish brow	n and pale		
		0.6	SS-2	2-2-3 (5)	areen. (mottled 10)	YR 5/4 and 10G 6/2), m	pist. loose.		
-	6.5			(3)	slow dilatancy, fine	silica sand, 17% mode	rate /	1	-
-	0.0				plasticity fines			1	-
-							-	1	-
-							-	1	-
-							-	1	-
-							-	1	-
-									=
_									_
10	10.0							<u> </u>	_
30.9				0.44.04	Silt With Sand And	<b>d Limestone (ML)</b> ⊢orange, (10YR 7/4), we	at hard .		
		0.9	SS-3	9-14-24 (38)	<ul> <li>nonplastic, very rap</li> </ul>	oid dilatancy, moderate	to strong _	Ш	
	11.5			(,		materials, 15-20% very			
					limestone, all mater	d, 40% fine to coarse gr rial carbonate	avei-sizeu /		
_									_
_							-	1	
-							-	1	Driller's Remark: Lost circulation at 13.0'
-							-	1	-
-								1	-
-								1	-
15 <u> </u>	15.0				Sandy Silt And Lin	nostono (ML)		<b> </b>	_
				1-1-8		orange, (10YR 7/2), we		Ш	_
-		0.6	SS-4	(9)	\ stiff, nonplastic, 29°	% fine to coarse sand, 1			0 1104 . 5/04/07 . 10 0
_	16.5				coarse sized limest	one			Set HW casing 5/31/07 at 16.0'
I _									
I -									
I -							•		
-								1	-
_							•	1	7
20								1	-
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PROJECT NUMBER:	BORING NUMBER:
338884.FL	E-01

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## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS	: 3.2 ft bo	gs on 5/30	)/07	START : 5/30/2007
>				STANDARD	SOIL DESCRIPTION g COMMENTS
AND (f)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,
H BE ATIC		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
20.9	20.0			( )	Silt With Sand (ML)
-		1.4	SS-5	6-9-13 (22)	20.0-21.4' - grayish orange, (10YR 7/4), wet, very stiff, nonplastic, rapid dilatancy, mild to moderate HCl
-	21.5			(22)	reaction, 20-25% fine to coarse sand-sized, 5-10% fine gravel-sized limestone
					\langle
					]
_					<b>]</b>
-					<b>]</b>
-					
-					
25 <u> </u>	25.0				Silty Sand (SM)  Carbonate material
-		1.4	SS-6	6-11-15	25.0-26.4' - grayish orange, (10YR 7/4), wet, medium
-	26.5	1.4	33-0	(26)	dense, fine to coarse grained, mild to moderate HCl reaction, 42% nonplastic fines, 12% fine to coarse
-	20.5				gravel-sized limestone
-					<b>1</b>
-					<b>1</b>
_					1
					]
l -					
30	30.0				
10.9		l		1-0-9	Silty Sand With Limestone (SM) 30.0-31.2' - Same as 25.0-26.4'
-		1.1	SS-7	(9)	
-	31.5				
-					-
-					
-					<b>1</b>
-					<b>1</b>
-					1
35	35.0				1
5.9				2-10-8	Silty Sand With Limestone (SM)  35.0-35.5' - moderate yellowish brown, (10YR 5/4),
_		0.5	SS-8	(18)	\ wet, medium dense, fine to coarse grained, mild to \ \
-	36.5				moderate HCl reaction in all materials, 27%   nonplastic fines, 36% fine to coarse gravel-sized   -
-					limestone fragments
-					- Dilliel 3 Nethalk. Lost disculation at 37.0
-					- <del> </del>
-					
-					
40					



PROJECT NUMBER:	BORING NUMBER:				
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

VA/ATED						otary, auto nammer, AVVJ 100			ORIENTATION : Vertical				
WATER	LEVELS	. 3.∠ π bo	us on 5/30		START : 5/30/2007		LOGGE	₹∶ <u>Β.</u>	EIIIS COMMENTS				
30₽				STANDARD PENETRATION		SOIL DESCRIPTION		99	COIVIIVIEN 13				
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SUI NVV	ME, USCS GROUP SYMBOL	COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,				
H BE ACE		RECOVE	ERY (ft)		MOISTURE	E CONTENT, RELATIVE DE	ĬΟ	DRILLING FLUID LOSS, TESTS, AND					
FR	#TYPE 6"-6"-6"				CONSISTEN	NCY, SOIL STRUCTURE, MI	NERALOGY	Ĭ ₩	INSTRUMENTATION				
								S	D 31				
0.9	40.0	0.6	SS-9	13-50/4 (63/10")		<b>Limestone And Sandy Silt</b> ark yellowish brown and mo			Driller's Remark: Chatter at 40.0' Carbonate material				
	40.8			(03/10 )	yellowish brow	n, (10YR 4/2 and 10YR 5/	4), 70% of		Begin core at 41.0' 5/31/07, 10:45				
					sample is lime	stone in fine sand-sized to agments, with mild HCl re	coarse						
	1				30% of sample	e is sandy silt, moist, hard,	low plasticity	1	_				
-	1				rapid dilatancy	, mild HCl reaction, with v	arved	1	-				
-	1				appearance			1	-				
-					See the next s	oring at 41.0 ft bgs sheet for the rock core log	-	1	-				
-						moor or the rook core log		┨	-				
-							-	-	-				
-								1	-				
45								1	_				
-4.1								1	_				
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50	1							1	<u> </u>				
-9.1	1						_	1					
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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 3.2	ft bgs	s on 5/	30/07 START : 5/30/2007 END : 6/3	3/2007	LOGGER : B. Ellis			
≥o⊋	(%			DISCONTINUITIES	ပ္က	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
_	41.0		>10	41.0-41.2' - Fracture zone, rounded to angular limestone rock fragments (gravel		Limestone - 41.0-41.4' - coarse gravel (limestone	Casing depth 41.0'		
-			1	size) 41.3' - Fracture, 40 deg, rough, undulating, open 42.35' - Fracture, horizontal, rough, planar,		<ul> <li>and chert)</li> <li>41.4-43.0' - pale yellowish brown,</li> <li>(10YR 6/2), dense, very fine grained, moderate HCl reaction, medium</li> </ul>	NR = No Recovery		
_ _	R1-HQ 5 ft 70%	63	1	3/4" boring in fracture, tight		<ul> <li>strong to strong (R3 to R4), cavities</li> <li>up to 2-3/8"-2-3/4"x3/4"-1-3/16",</li> <li>infilled with medium grained</li> </ul>			
45							2	of surface covered by black organic coating up to 1/16" or less over 1-2% of surface, fossils rare to absent, 43.6-44.5"	-
-4.1 - -	46.0		NR	44.3' - Fracture, 20-30 deg, rough, stepped, open 44.3-44.5' - Fracture, 80 deg, rough, stepped,		- 43.0-44.5' - pale yellowish brown, (10YR 6/2), dense, fine to medium grained, mild to moderate HCl	R1: 14 minutes -		
-			4 (	open 46.2' - Fracture, 80 deg, rough, planar, thin (<1/1/16") layer of black (N1) carbonaceous		reaction, medium strong to weak (R3 to R2), voids (generally <1/16") over 3-5% of surface grading to 10% with	-		
-	R2-HQ		0	material, open 46.6' - Fracture zone, 40 deg, very rough, planar, open 46.7' - Fracture, horizontal, rough, planar,		<ul> <li>depth, fossils (molds/casts) rare to absent</li> <li>No Recovery 44.5-46.0'</li> </ul>	-		
-	5 ft 100%		2	open 46.9' - Fracture, horizontal, smooth, planar, open		Limestone 46.0-48.5' - Same as 43.0-44.5' except voids increase to 5-8%, cavities common (typically			
50 -9.1 -			1 2	48.7' - Fracture, 10 deg, smooth, undulating, open — 48.9' - Fracture, 20 deg, smooth, undulating 49.3, 49.7' - Fractures (2), horizontal,		\[ \frac{1}{1}6"x3/16"), fossiliferous \\ \text{(molds/casts)} \]  = \[ \frac{\sitty Sand (SM)}{48.5-51.0'} - \text{grayish orange to dark} \]	R2: 3 minutes		
-	51.0		1	smooth, undulating, tight - 50.7' - Fracture, horizontal, smooth, undulating, open -		yellowish brown, (10YR 7/4 to 10YR 6/6), mild HCl reaction, interbedded with clay, carbonate-derived			
-			10	51.0-51.3' - Fracture zone, rough, stepped, various orientation of fractures, open, gravel to cobble sized limestone rock fragments 52.2-52.9' - Fracture, 80 deg, rough,		silts/clays/sand-size fragments (cohesive), with some black (N1) carbonaceous/organic			
-	R3-HQ 5 ft 56%	42	10	undulating, tight 52.4-53.8' - Fracture zone, intersecting fractures from 50 deg to 90 deg, rough,	laminae/deposits, fossils absent  Limestone 51.0-53.8' - moderate yellowish brown, (10YR 5/4), mottled yellowish				
-55_ -14.1 -	50.0		NR	stepped to undulating, tight to open		gray (5y 7/2), fine grained, mild HCl reaction, very weak (R1), voids (up to 1/16"-1/8") over 15-20% of surface, some cavities up to 3/8", some fossil molds/casts, occasionally thinly	R3: 5 minutes		
- -	56.0		2	56.3' - Fracture, 10 deg, very smooth,		laminated with black (N1) organic/carbonaceous material No Recovery 53.8-56.0'			
-	D4 HO		2	56.6-57.0' - Fracture zone, rough, planar to undulating, large coarse gravel to cobble size, low to high angle fracture planes, open 57.2' - Fracture, 10 deg, rough, stepped.		Silty Sand (SM) - 56.0-56.6' - Same as 48.5-51.0'			
-	R4-HQ 5 ft 80%	42	1	open 57.5-58.0' - Fracture zone, rough, planar to undulating, large coarse gravel to cobble		- -			
- 60_ -19.1			1 si 58	size, low to high angle fracture planes, open 58.0' - Fracture, horizontal, smooth, planar, tight, black (N1) carbonaceous film/coating over 90-95% of surface		- <del>-</del>	R4: 5 minutes		
	61.0		NR	over 90-90% or surface	H	-			



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 3.2	2 ft bas	s on 5	30/07 START : 5/30/2007 END : 6/	3/200	7 LOGGER : B. Ellis	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			>10	58.5' - Fracture, 5 deg, smooth, planar, tight, black carbonaceous film/coating over 80% of surface		Limestone 56.6-60.0' - moderate yellowish brown, (10YR 5/4), fine grained, mild	-
_	Dr. IIO		1	59.6' - Fracture, 10 deg, rough, undulating to stepped, tight 61.0-61.6' - Fracture zone, rough, undulating, gravel-sized, angular to subangular limestone		HCI reaction, weak to medium strong (R2 to R3), voids 1/16" or less over 5% of rock surface, some cavities generally 3/8" in diameter or less,	-
_	R5-HQ 5 ft 70%	45	2	fragments, various fracture orientations, open 61.6' - Fracture, horizontal, rough, undulating, open		numerous thin, wispy, discontinuous black carbonaceous laminae, rare zone of very weak to extremely weak	-
65_ -24.1			1	61.8' - Fracture, 0-90 deg, rough to smooth, stepped, black carbonaceous film over 10% 62.4' - Fracture, horizontal, smooth,		- (R1-R0) rock (typically as cavity infilling)  No Recovery 60.0-61.0'	R5: 5 minutes
-24.1	66.0		NR	undulating, tight, dark gray carbonaceous film over 50% 63.15' - Fracture, horizontal, rough,	Ē	Limestone 61.0-61.6' - moderate yellowish brown, (10YR 5/4), medium grained,	- Mast down at 15:15
-			>10	undulating, open 63.7' - Fracture, 60 deg, rough, undulating 64.1' - Fracture, horizontal, smooth,		<ul> <li>mild HCl reaction, extremely weak</li> <li>(R0), friable, cavities and voids</li> <li>absent, fossils absent</li> </ul>	
-	R6-HQ		2	undulating 66.5' - Fracture, 30 deg, rough, stepped, open, silt lining <1/16" thick		61.6-64.5' - moderate yellowish brown becoming grayish orange with depth, (10YR 5/4 to 10YR 7/4), fine	- -
_	5 ft 73%	52	3	66.5-67.0' - Fracture zone, irregular angles, rock fragments 67.0' - Fracture, 0-90 deg, rough, stepped,	H	grained, mild HCl reaction, weak to medium strong (R2 to R3), voids 1/16" over 5-7% of core surface,	-
70 -29.1			1 NR	open 67.8' - Fracture, 10 deg, rough, highly undulating to stepped, tight		unevenly distributed, few cavities generally 3/8" or less in diameter, thin black discontinuous	R6: 4 minutes
_	71.0		INIX	68.1' - Fracture, horizontal, rough, undulating, open 68.5, 68.75, 69.35' - Fractures (3), 10 deg,	Ħ	carbonaceous laminae common, fossil molds/casts rare to absent No Recovery 64.5-66.0'	Core was stuck in core
_			3	very rough, undulating, open 71.5' - Fracture, 0-45 deg, rough, planar, open 71.9' - Fractures (2) 45 deg, amount		Limestone 66.0-67.7' - pale yellowish brown grading to dark yellowish brown, (10YR 6/2 to 10YR 4/2), fine to	barrel, required all rods to be removed
_	R7-HQ		1	71.8' - Fractures (2), 45 deg, smooth, undulating, open 71.9-72.2' - Fracture zone, irregular angles 72.2' - Fracture, horizontal, smooth, planar,	Ħ	medium grained, mild HCl reaction, weak to medium strong (R2 to R3), voids up to 1/16" over 15-20% of	-
_	5 ft 34%	18	NR	open	Ħ	surface, some cavities (generally 3/16" or less in diameter), fossil molds/casts rare	-
75 -34.1			IVIX	<u>-</u>		67.7-67.8' - Same as 66.0-67.7' — except dark yellowish brown, (10YR 4/2), medium grained, extremely	R7: 8 minutes
_	76.0					weak (R0)  67.8-68.1' - grayish orange mottled with pale yellowish brown, (10YR 7/4	]
			3	76.4' - Fracture, horizontal, smooth, planar, open 76.5' - Fracture, horizontal, rough, undulating,		and 10YR 6/2), fine to medium grained, mild HCl reaction, extremely weak (R0), voids/cavities/fossils	]
_	R8-HQ 5 ft	83	2	open 76.7' - Fracture, 0-20 deg, rough, stepped, open 78.0' - Fracture or mechanical break,		absent, possible intraclasts of very weak (R1) rock 68.1-69.45' - pale yellowish brown,	}
-	98%		0	horizontal, rough, undulating, tight 78.9' - Fracture, 30 deg, rough, planar		(10YR 6/2), fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids 1/16" over 10-15% of rock surface,	_
80 -39.1 -			1	_		few cavities (<3/8" in diameter), trace fossil casts/molds	SC-1 collected at 79.7- 80.8' R8: 10 minutes
	81.0				H		
					1		I



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

				VENT : CIVIE 550X S/N 540253, ITIUU TOLAIY, FIQ LOOIS, FIV			ORIENTATION: Vertical
WATER	LEVELS : 3.2	tt bgs	s on 5		3/200		001115150
≥O ₽	(%			DISCONTINUITIES	စ္က	LITHOLOGY	COMMENTS
N A N	ZNN SO		SL	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ᆲ빙은	EN.TH	(%) Q	12,0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	7 ቯ [	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FF ¥	RE COV	αD	ACT R F(	PLANARITY, INFILLING MATERIAL AND	MB(	AND ROCK MASS	SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
			NR/	80.85' - Fracture, 40 deg, rough, planar, tight,		Limestone	
-			1	<1/16"-sized black "peppering" of amorphous	╁	- 69.45-69.65' - grayish orange, (10YR	1
_				mineral over 8-10% of fracture plane surface	₽	7/4), fine grained, mild HCI reaction,	-
			1	81.5' - Fracture, horizontal, rough, undulating, open	Ш	very weak to weak (R1 to R2), fossils absent, voids <1/16" over <1%,	
			'	82.5' - Fracture, 75 deg, rough, undulating,	Н	cavities absent, some very thin dark	
_	R9-HQ			fracture plane extends from 82.2-82.8'		gray laminations	1
-	5 ft	46	2	83.1' - Fractures, 0-40 deg, rough, stepped,	ш	No Recovery 69.65-71.0'	1
-	68%			open 83.3' - Fracture, 0-90 deg, rough, stepped,	$+\Pi$	Limestone 71.0-72.7' - light olive gray to	-
1 _			0	open		- moderate yellowish brown, (5Y 5/2 to	_
85				Spot.	Н	10YR 5/4), fine grained, mild to	
-44.1			NR	_	Ш	moderate HCl reaction, strong (R4),	R9: 6 minutes
-	00.0				╁┤	voids 1/16" over 10-15% of surface, some cavities generally 3/8" in	1
-	86.0					diameter or less, sparsely	Start drill at 07:30 on
_			1		₽	fossiliferous casts/molds	6/3/07
_				86.85' - Fracture, 45-60 deg, rough,		No Recovery 72.7-76.0'	
				undulating, several intersecting fracture		Limestone 76.0-78.5' - mottled yellowish gray to	Driller's Remark: Lost
-			3	planes, open	╁	light olive gray, (5Y 7/2 to 5Y 5/2),	circulation at 87.0'
-	R10-HQ			87.1' - Fracture, 50 deg, rough, planar,	ш	fine to medium grained, mild to	1
-	5 ft	80	1	conical 87.45' - Fracture, horizontal, rough,	+	_ moderate HCl reaction, medium	-
_	86%			undulating, tight		strong to strong (R3 to R4), voids typically 1/16" or less over 5-10% of	_
			0	87.85, 88.6' - Fractures (2), horizontal,	$oldsymbol{oldsymbol{eta}}$	rock surface, some cavities generally	
90			"	smooth, planar		3/8" in diameter or less but up to	
-49.1			0	_	Н	1-3/16" in diameter (filled with silty to	R10: 7 minutes
-			NR			sandy carbonate grains), fossils rare as molds/casts, <1% of surface	1
-	91.0				Ш	having a patina of white very fine	-
_			1	91.3' - Mechanical break	+	grained carbonate staining/film	1
				91.7' - Fracture, horizontal, smooth, planar,		78.5-79.5' - grayish orange, (10YR 7/4), fine grained, none to mild HCl	_
				tight		reaction, extremely weak (R0), very	Cavity filled with organic
			0		Ш	friable, voids <1/16" over <1%,	material at 92.1'
-	R11-HQ				Н	- cavities absent, non-fossiliferous,	1
-	5 ft	83	2			rare intraclasts (<1/4") of grayish very weak to weak(R1 to R2)	-
_	96%			93.6' - Fracture, 20 deg, rough, planar, coarse gravel sized fragments at interface,	₽Ч	- limestone	1 4
			2	open	Ш	_ Silt (ML)	0-11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-
95			_	93.95, 94.25' - Fractures (2), horizontal,		79.5-79.7' - grayish orange, (10YR	Cavities at 94.4-94.6' and 94.6-94.8'
-54.1			4	rough, undulating, open		7/4), mild HCl reaction, carbonate derived	R11: 6 minutes
-	00.0		1	94.95' - Fracture, horizontal, rough, planar, open		Limestone	1 - 1
-	96.0		NR.	95.25' - Fracture, horizontal, rough,	₽	79.7-80.9' - grayish orange to very	1
-			7	undulating to stepped, open	Ш	pale orange, (10YR 7/4 to 10YR 8/2),	1 4
			<u> </u>	96.4' - Fracture, horizontal, rough, undulating,	$\Box$	very fine grained, moderate HCl	
]				open 96.45' - Fracture, vertical, smooth, planar,		reaction, medium strong to weak (R3 to R2), voids 1/16" or less over 1-3%	1
-			>10	open	Ш	of rock surface, cavities rare, trace	] 1
-	R12-HQ			96.5' - Fracture, <5 deg, smooth, undulating,	+	fossil casts/molds	1
-	5 ft	18	>10	open	$\Box$	No Recovery 80.9-81.0'	-
_	88%			96.6' - Fracture, 60 deg, smooth, slightly undulating, tight	╁┼┤	Limestone - 81.0-81.5' - Same as 79.7-80.9'	
			<b>\_10</b>	96.7' - Fracture, horizontal, rough, planar to	Ш	55 515 Suine as 75.7-00.5	SC-2 collected at 99.0-
100			>10	stepped, open	$\vdash$		99.9'
-59.1			2	96.8' - Fracture, horizontal, rough, planar,		H	R12: 6 minutes
-			NR	open	ΗП	<u> </u>	1
	101.0		INIC		$\vdash$		
							1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-01	SHEET	7	OF	13	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 3.2	2 ft bgs	s on 5/	30/07 START : 5/30/2007 END : 6/3	3/2007	LOGGER : B. Ellis	
<b>₹</b> □₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
TH B FACI	E RU 3TH, OVE	R Q D (%)	FOC	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOL	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	A Q	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				96.9' - Fracture, vertical, smooth, planar,	ш	81.5-83.5' - moderate yellowish	08:30 rig stops for water
_			10	open - 97.0' - Fracture, horizontal, rough, stepped,	Ш	brown with yellowish gray limestone interbeds, (10YR 5/4 with 5Y 7/2),	refill – SC-3 collected at 101.75- –
			. 40	open	Ш	fine to medium grained, mild to	102.8'
			>10	97.0-98.0' - Fracture zone, rough, undulating - to stepped, vertical to subvertical, open	Н	moderate HCl reaction, weak to medium strong (R2 to R3), HCl	
	R13-HQ 5 ft	53	>10	98.23' - Fracture, horizontal, smooth, undulating to planar, open -	H	reaction strong where patina of very fine grained limestone coats core	
	100%	55	-10	98.5' - Mechanical break	Ħ	surface, abundant fractures,	
_			10	98.6-99.0' - Fracture zone, 0-90 deg, rough, stepped to undulating, open -	戽	breccia-like features (with possible intraclasts) common from 82.7-83.5',	_
105_				99.9-100.05' - Fracture zone, rough, planar,	Ш	voids up to 1/16" over 15-20% of	
-64. <del>1</del> -			5	various fracture orientations, gravel sized rock fragments, open -	Н	surface, cavities common (up to 2-3/8"-2-3/4" in length, 1-9/16"-2"	R13: No time recorded
_	106.0			100.2' - Fracture, horizontal, smooth, planar, open	H	wide and extending 3/4"-1-3/16" into core), fossiliferous (casts/molds)	00:20 hadia diil - 11 4 h -
-			4	100.5' - Fracture, horizontal, rough, planar to -	鬥	83.5-84.4' - yellowish gray, (5Y 7/2),	09:30 begin drill, add 1 bag mud -
-				stepped, open 101.4' - Fracture, 0-45 deg, smooth, planar,	口	fine grained, moderate to strong HCI reaction, weak to medium strong (R2	Driller's Remark: Drill
-			4	open _	団	to R3), voids (1/16" or less) unevenly distributed over 15% of rock surface,	chatter throughout run -
_	R14-HQ			101.6-101.75' - Fracture zone, 0-50 deg, rough, undulating, open	団	cavities (<3/16"), fossil molds/casts	-
_	5 ft	53	>10	102.8' - Fracture or mechanical break,	Ш	rare to absent No Recovery 84.4-86.0'	-
_	92%			102.8-103.1' - Fracture zone, gravel-sized	╁┼┼	Limestone	-
110			4	rock fragments, multiple fracture orientations _ 103.13, 103.2, 103.3, 103.45' - Bedding plane	Ħ	86.0-87.4' - dusky yellow with yellowish gray interbeds, (5Y 6/4 with	-
-69.1			0	(4), horizontal, rough, planar to stepped, discontinuous, open	Ħ	5Y 7/2), fine to very fine grained, weak to medium strong (R2 to R3),	R14: 4 minutes
_	111.0		NR	103.5' - Fracture, 45 deg, smooth, planar,	Ħ	voids 1/16" or less over 25-30% of	SC-4 collected at 110.15 111.0'
_			. 40	tight - 103.8, 103.9' - Fractures (2), horizontal, _	H	rock surface, some cavities up to 1-3/16"-1-9/16" x 3/4"-1-3/16", very	1
			>10	rough, planar	片	fine grained limestone from	1
			>10	104.1, 104.2' - Fractures (2), horizontal, rough, stepped, open	Н	86.7-86.8', very fine grained intraclast from 87.0-87.4'	
			- 10	104.7' - Fracture, rough, cone-shaped 104.7-104.75' - Fracture zone, gravels sized -	뛴	(subangular, up to 1/2"-3/4"), some fossil molds/casts	]
	R15-HQ 5 ft	15	>10	fragments of irregular shape and fracture	尸	87.4-88.6' - very light gray, (N8), fine	
_	76%			orientation 104.83' - Fracture, horizontal, smooth, planar  -	耳	grained, strong HCl reaction, very weak (R1), voids (1/16" or less) over	_
_			>10	105.2, 105.45, 105.57, 105.7, 105.9' - Bedding plane (5), horizontal, rough, planar	口	3-5% of rock surface, cavities rare	_
115_ -74.1				to stepped, open —	丗	(typically 3/8"x3/16"), trace fossil molds and trace echinoderms	R15: 5 minutes
-,,-			NR	106.3' - Fracture, horizontal, smooth, planar 106.4-106.5' - Fracture zone, horizontal,	丗	88.6-90.3' - variegated pale yellowish brown to moderate yellowish brown,	- IN 13. 3 Hilliutes
-	116.0			planar, multiple fragments -	丗	(10YR 6/2 to 10YR 5/4), fine to	-
-			4	106.55' - Fracture, horizontal, smooth, planar 106.6' - Fracture, horizontal, smooth, planar	╁	medium grained, moderate HCl reaction, very weak to weak (R1 to	
-				106.9' - Mechanical break, horizontal, - smooth, planar	A	R2), voids up to 1/16" over 5-8%, cavities (typically 3/8"x3/16"),	
-			4	107.4' - Fracture, horizontal, rough, planar	甘	fossiliferous (molds/casts),	-
-	R16-HQ			107.5' - Fracture, horizontal, rough, _ undulating	Ħ	echinoderms, becomes coarse grained with depth from 90.2-90.3'	
-	5 ft 96%	55	0	107.8' - Fracture or mechanical break,	丗	and extremely weak rock (R0) with	
-	33,3			horizontal, smooth, undulating 107.9' - Fracture or mechanical break,	世	some black carbonaceous material No Recovery 90.3-91.0'	1
120			4	horizontal, smooth, undulating 108.0-108.3' - Fracture zone, horizontal,	幵		1
-79.1			6	smooth, planar, bedding plane separations at	H		R16: 4 minutes
	121.0		6	108.0, 108.1, 108.2, 108.25, 108.3'	H		



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	E-01	SHEET	8 OF 13

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 3.2	ft bgs	s on 5/	30/07 START: 5/30/2007 END: 6/	3/200	7 LOGGER : B. Ellis	
> O ::	(9)			DISCONTINUITIES	Ö	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	E.R.D.	D (%)	T.00-	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
EPT SURF	SECO	RQD	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	∀ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ΔОШ	Olk	Ľ	шп	108.5-109.0' - Fracture zone, horizontal,	S	Limestone	
-			>10	smooth, planar, open	F	- 91.0-92.0' - very light gray, (N8), fine	1 -
_				109.05' - Bedding plane, horizontal, rough, planar to stepped, open	亡	grained, strong HCl reaction, weak to medium strong (R2 to R3), voids	1 -
-			>10	109.5, 109.85, 109.98' - Bedding plane (3),	╀	- 1/16" or less over 10-15% of rock	1 -
_	R17-HQ			horizontal, rough, undulating, open 111.0-112.55' - Bedding plane, horizontal,		surface, several cavities typically 3/8"x3/16", trace fossil molds/casts	1 -
-	5 ft	0		rough, planar to undulating, open, 0.1' thick	$\perp$	<ul> <li>with occasional echinoderm fossils</li> </ul>	1 4
_	40%			or less throughout interval, multiple breaks 112.3-113.7' - Fracture zone, smooth to	+	92.0-93.5' - Same as 88.6-90.3' except trace black	
_			NR	rough, planar to undulating, coarse gravel to	H	<ul> <li>carbonaceous/organic discontinuous</li> </ul>	1 -
125 <u></u> -84.1				cobble size fragments, various fracture plane	Ħ	laminae/cavity infilling, intraclasts (up to 1-9/16"-2", subrounded) common	
-04.1				114.4-114.8' - Fracture zone, smooth to	H	_  93.2-93.5'	R17: 4 minutes
_	126.0		0	rough, planar to undulating, coarse gravel to cobble size fragments, various fracture plane	₽	93.5-95.45' - yellowish gray to very light gray, (5Y 8/1 to N8), fine to	Drillaria Domaria Larga
_			<u> </u>	orientations, open	$\vdash$	medium grained, strong HCI	Driller's Remark: Large rock fragment jammed in
_				116.15' - Fracture, horizontal, rough, stepped, open	口	reaction, very weak (R1) rock from 93.5-94.3', becoming weak rock (R2)	tip of core barrel. 10:30 drilling suspended to fix
_				116.27' - Fracture, 10 deg, rough, undulating,	士	from 94.3-95.2' and returning to very	wireline spool -
_	Dialio			open 116.57' - Fracture, horizontal, rough, planar,	╁	weak rock (R1) from 95.2-95.45',   voids (1/16" or less) over 3-5% of	One rock fragment 2.4"long was all that was
_	R18-HQ 5 ft	0	NR	open .	Ė	rock surface and unevenly	recovered during coring
_	4%		INIX	116.68' - Fracture, horizontal, rough, planar to undulating, open	Ľ	distributed, some cavities up to 1-3/16"-1-9/16"x3/8" over 2-3% of	No void reported.
_				117.02' - Fracture, horizontal, rough,	₽	rock surface, chalk-like texture when	Driller's Remark: Strong -
130				stepped, open 117.07' - Fracture, vertical, rough, stepped, —	$\vdash$	scraped with pocket knife, fossil molds/casts rare to absent	I <sub>B40.0</sub>
-89.1				open	П	Peat	R18: 3 minutes
_	131.0			117.1' - Fracture, 20 deg, rough, stepped, conical, open	口	95.45-95.7' - black to grayish black, (N1 to N2), no HCl reaction, firm to	1
_			8	117.32' - Fracture, horizontal, rough,	L	stiff, interlaminated with some very	1
_				undulating, open 117.9' - Mechanical break	╁╴	weak limestone Limestone	1 4
_			5	118.5' - Mechanical break	F	95.7-95.8' - Same as 93.5-95.45'	1 4
_	Dialio			119.3' - Fracture, horizontal, rough, undulating, open	Ħ	except very weak (R1), friable  No Recovery 95.8-96.0'	Drillaria Danaariy Strang
_	R19-HQ 5 ft	22	>10	119.4' - Fracture, horizontal, rough, stepped,	L	_ Limestone	Driller's Remark: Strong chatter from 133.0-136.0'
-	92%			open 119.72' - Fracture, horizontal, rough,	$\vdash$	96.0-100.4' - yellowish gray, (5Y 8/1), strong HCl reaction, weak to medium	Many fractures reculted
-			6	stepped, open 119.8' - Fracture, horizontal, rough, planar,	F	strong (R2 to R3), voids 1/16" or less	Many fractures resulted from breakage along weak -
135 <u> </u>				open —	口	over 5-10% of rock surface, cavities typically 3/8" in diameter over 3-4%,	bedding planes when removing sample from core
-			>10	120.05, 120.12, 125.25, 120.45, 120.65' - Fractures (5), horizontal, rough, planar to	士	trace fossil molds/casts	barrel -
-	136.0		NR	undulating, open	╁╴	No Recovery 100.4-101.0' Limestone	R19: 5 minutes
-			10	120.75' - Fracture, 0-60 deg, rough, stepped, open	F	101.0-106.0' - very pale orange to	-
-				121.0' - Fracture zone, unconsolidated, 1/2"-	片	yellowish gray, (10YR 8/2 to 5Y 7/2), fine to medium grained, strong HCl	-
-			10	4" fragments 131.1, 131.3, 131.35, 131.4, 131.45, 131.55,	世	reaction, weak (R2), chalky texture when scraped with pocket knife.	-
-	R20-HQ			131.7, 131.8' - Fractures (8), horizontal,	ᡛ	voids up to 1/16" over 10% or less of	-
-	5 ft	0	7	rough, planar to undulating, open 132.25, 132.3, 132.38, 132.8, 132.9' -	$\vdash$	rock surface, some cavities up to 3/8" in diameter, some echinoid	-
-	66%		0	Fractures (5), horizontal, rough, planar to undulating, open	口	<ul> <li>fossils in addition to sparse</li> </ul>	-
-			Ť	133.1, 133.25, 133.4, 133.5, 133.6, 133.7,	士	occurrences of molds/casts 106.0-110.6' - Same as 101.0-106.0'	-
140 <u> </u>			NR	133.8, 133.85' - Fractures (8), horizontal, rough, planar to undulating, open	$\vdash$	except echinoderm fossils common	R20: 4 minutes
-	 			133.85-134.15' - Fracture zone, 0-90 deg,	F	from 106.0-107.4' No Recovery 110.6-111.0'	-
-	141.0			rough, undulating to stepped, open	Ħ		-
					1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-01	SHEET	9	OF	13	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 3.2	2 ft bg:	s on 5	/30/07 START : 5/30/2007 END : 6/	3/200	7 LOGGER : B. Ellis	
>00	(0			DISCONTINUITIES	l o	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	E RU	(%) Q	150	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EVENT I	SORE	ROD	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3×ME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	014	ш.	ш.п.	134.15, 134.25, 134.4, 134.5, 134.6, 134.8,	+ "	Limestone	
-			1	135.85' - Fractures (7), horizontal, rough,	H	<ul> <li>111.0-113.7' - Same as 101.0-106.0'</li> </ul>	-
-				planar to stepped, open 135.07' - Fracture, horizontal, rough, planar,	Ħ	except echinoid fossils rare to absent 113.7-114.45' - yellowish gray, (5Y	-
-			4	open	t	<ul> <li>8/1), very fine grained, strong HCI</li> </ul>	1
-	R21-HQ			135.07-135.7' - Fracture zone, multiple coarse gravel to cobble-sized fragments,		reaction, extremely weak (R0), voids/cavities absent, fossils absent	1
-	5 ft 88%	62	4	various fracture plane orientations 135.7' - Fracture, horizontal, rough, stepped,	╙	- 114.45-114.8' - Same as 111.0-113.7'	1
-	00%			open	I	No Recovery 114.8-116.0'	1
145			2	135.85' - Fracture, horizontal, rough, planar, open	仜	<ul> <li>Limestone 116.0-119.7' - yellowish gray, (5Y</li> </ul>	SC-5 collected at 144.5-
-104.1			0	136.1, 136.2, 136.3' - Fractures (3),	$\perp$	7/2), fine grained, strong HCI	145.4' — R21: 5 minutes
-	146.0		NR	horizontal, rough, planar, open 136.4-136.6' - Fracture zone, bounded by	╁	<ul> <li>reaction, very weak to weak (R1 to R2), chalky texture when scraped</li> </ul>	K21. 5 minutes
-	146.0			planar to undulating, rough, open bedding	Ħ	with knife, voids (<1/16" over 1-2%	
-			>10	planes 136.8, 136.9' - Fractures (2), horizontal,	Ħ	<ul> <li>of surface, few cavities (generally 3/8" in diameter or less), fossils rare</li> </ul>	1
-				rough, undulating, open	Ľ	to absent (trace echinoderms)	1
-			2	137.05, 137.2, 137.35, 137.6, 137.75, 137.8, 137.85, 138.0, 138.1, 138.2, 138.25, 138.35,	╙	_ 119.7-120.8' - yellowish gray, (5Y 7/2), medium to coarse grained,	1
-	R22-HQ		_	138.5, 138.55' - Fractures (14), horizontal,	F	strong HCl reaction, very weak (R1),	1
-	5 ft 88%	68	2	rough to smooth, planar to undulating, open 138.5' - Mechanical break	Ш	voids <10%, some cavities (typically <3/8" in diameter), fossiliferous	1
_				138.85' - Fracture, horizontal, rough, planar 141.4' - Fracture or mechanical break,	ш	(molds/casts), pelecypods, gastropods, some echinoderms	1
150			2	horizontal, rough, planar		(fossil hash)	1
-109.1			0	142.0' - Fracture, horizontal, rough, planar 142.12' - Fracture, horizontal, rough, planar,	$\vdash$	No Recovery 120.8-121.0' 121.0-123.0' - yellowish gray, (5Y	R22: 7 minutes
_	151.0		NR	open	H	7/2), fine grained, strong HCl	1
			2	142.0-142.12' - Fracture zone 142.33, 142.40' - Fracture or mechanical	H	reaction, extremely weak (R0), very friable, 40-50% fine to medium	Start drill at 12:15 Add 1/2 bag mud
				break (2), horizontal, rough, planar 142.9' - Fracture or mechanical break,		sand-sized grains grading to gravel-sized carbonate	SC-6 collected at 151.3-
_			3	horizontal, rough, planar		_ No Recovery 123.0-126.0'	152.35'
_				143.0' - Fracture, horizontal, rough, undulating, coarse gravel-sized rock	dash	<b>Limestone</b> - 126.0-126.2' - yellowish gray, (5Y	
_	R23-HQ 5 ft	80	0	fragments on bottom face	$\vdash$	7/2), medium to coarse grained,	Driller's Remark: Drilling in fourth gear, consistent
_	96%		Ľ	143.3' - Fracture, vertical, rough, stepped, tight	Д	strong HCl reaction, very weak to weak (R1 to R2), fossiliferous	chatter throughout run
_			0	143.4' - Fracture, horizontal, rough, stepped,	口	(echinoderms, fossil hash)	_
155 -114.1				open 143.7' - Fracture, 80 deg, rough, planar, tight —	口	No Recovery 126.2-131.0'  — Limestone	Large cast/void at 154.85',
-114.1			0	144.1' - Fracture, 80 deg, rough, stepped, (intersects fracture at 143.7')	$\vdash$	131.0-135.6' - Same as 111.0-113.7' <b>No Recovery 135.6-136.0'</b>	155.2', 155.8'
-	156.0		NR	144.50' - Fracture or mechanical break,	$\vdash$	- Limestone	R23: No time recorded  Lost 2.0' due to having to
-			1	horizontal, rough, undulating 146.4' - Fracture, horizontal, rough,	F	136.0-137.9' - Same as 131.0-136.0' 137.9-138.2' - olive gray, (5Y 3/2),	break 2.9' long piece to box -
-			_	undulating, organic staining on bottom face	片	<ul> <li>fine to medium grained, strong HCl</li> </ul>	-
-			1	146.4-146.6' - Fracture zone, smooth, planar, coarse gravel to cobble-sized fragments	世	reaction, very weak (R1), thinly laminated	-
-	R24-HQ			146.6' - Fracture, horizontal, rough,	世	_ 138.2-138.5' - Same as 136.0-137.9'	-
-	5 ft	55	1	undulating, tight 146.8' - Fracture, vertical, rough, planar,	$\vdash$	138.5-138.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl	SC-7 collected at 158.3-
-	80%			tight, fracture plane extends from 146.6-147.0'	F	reaction, weak (R2), laminated, voids (<1/16") 5-8% irregularly distributed	159.1'
100			2	147.0' - Fracture or mechanical break,	口	over core surface, few cavities	-
160 -119.1				horizontal, smooth, planar, open 147.0-147.2' - Fracture zone, rough, planar to	世	<1/16" in diameter, fossils (casts/molds) rare to absent	R24: 4 minutes —
-	161.0		NR	stepped, multiple fractures, open, angular	$\perp$	138.7-139.3' - Same as 121.0-123.0'	
	101.0			gravel size fragments	T	No Recovery 139.3-141.0'	



PROJECT NUMBER:

338884.FL BORING NUMBER:

E-01 SHEET 10 OF 13

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS: 3.2	ft bgs	on 5/	30/07 START : 5/30/2007 END : 6/	3/200	7 LOGGER : B. Ellis	
<b>₹</b> □₽	(%			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
ELO N (f	AND AND AY (%		ZES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B FACE	E RU STH, OVE	(%) <sub>Q</sub>	FOC	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	S S	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				147.7' - Fracture or mechanical break,	ш	Limestone	
-			3	horizontal, smooth, planar, tight 148.4' - Fracture or mechanical break, 0-50	Т	<ul> <li>141.0-141.35' - yellowish gray to pale yellowish brown, (5Y 7/2 to 10YR</li> </ul>	·
-				deg, smooth, planar, tight	╁	6/2), medium to coarse grained,	·
-			3	148.9' - Fracture, 70 deg, smooth, undulating, tight, fracture plane extends from	F	<ul> <li>strong HCl reaction, very weak (R1), voids (1/16") over 5-7% of surface,</li> </ul>	·
_	R25-HQ		_	148.5-149.5'	H	some cavities up to 3/8" in diameter, fossiliferous (echinoderm parts),	<u> </u>
	5 ft 96%	75	1	149.3' - Fracture, horizontal, very rough, undulating, tight	Ħ	molds/casts sparse	<u> </u>
			2	149.55' - Fracture, vertical, rough, undulating to stepped, tight		141.35-142.0' - pale yellowish brown, (10YR 6/2), fine to medium grained,	
165				149.8' - Fracture, 0-90 deg, rough, stepped,	$\mathbb{H}$	strong HCl reaction, weak to medium	_
-124.1			3	tight — tight — 151.2' - Fracture, 10 deg, rough, stepped,		strong (R2 to R3), voids up to 1/16"  over 10% of surface, few cavities	R25: 4 minutes
_	166.0		NR.	tight	Ш	generally 3/8" or less in diameter,	_
			8	151.3' - Fracture, 10 deg, smooth, undulating, tight	Щ	fossiliferous (echinoids), thinly laminated with wispy, discontinuous,	
			J	152.6' - Fracture, horizontal, smooth,	$\vdash$	black (N1) carbonaceous/organic	
_			6	undulating, tight 152.9' - Fracture, horizontal, smooth,	┢	material 142.0-143.05' - yellowish gray, (5Y	Loud drill chatter throughout, especially at -
_				undulating, open 152.97' - Fracture, horizontal, rough,	F	7/2), medium grained, strong HCl reaction, weak (R2), chalk-like	167.0
_	R26-HQ 5 ft	18	9	undulating		texture when scraped with knife,	Large cavity >3/4" at 168.0', 169.2'
_	68%			156.35' - Fracture, 10 deg, rough, undulating, open		irregular to undulating core surface, voids (<1/16" or less) over 1-2%,	-
_			2	157.9' - Fracture, horizontal, smooth,	L	_ cavities rare, fossils (molds/casts)	-
170_ -129.1			ND	undulating, open 158.0' - Fracture, 10 deg, smooth, planar —	₽	difficult to discern 143.05-145.4' - yellowish gray, (5Y	R26: 4 minutes
-129.1			NR	158.3' - Mechanical break 159.4, 159.7' - Fractures (2), horizontal,	F	_ 7/2), very fine grained, moderate to	R20. 4 minutes
-	171.0			rough, planar, open	厂	strong HCl reaction, medium strong to strong (R3 to R4), voids (1/16" or	-
-			2	161.35' - Fracture, horizontal, rough, undulating, tight	世	less) over 3% or less of rock surface, cavities common up to a few inches	-
-				161.6' - Fracture or mechanical break,		<ul> <li>in length (possibly bioturbated),</li> </ul>	-
-			5	horizontal, smooth, planar, open 161.95' - Fracture or mechanical break,	$\vdash$	fossiliferous (mostly casts), some pelecypod molds/casts	-
-	R27-HQ			horizontal, rough, planar, open	$\vdash$	- No Recovery 145.4-146.0'	-
-	5 ft 96%	57	10	162.2' - Fracture, horizontal, rough, undulating, open	Ħ	Limestone 146.0-146.4' - Same as	-
-	30 /0			162.45, 162.55' - Fracture or mechanical break (2), horizontal, rough, planar, open	Ħ	- 143.05-145.4' 146.4-148.1' - yellowish gray to pale	-
- 175			>10	163.5' - Mechanical break		yellowish brown, (5Y 7/2 to 10YR	-
-134.1			10	163.65' - Fracture or mechanical break, — horizontal, smooth, planar, open	世	6/2), fine grained, moderate HCl reaction, weak to medium strong (R2)	R27: 4 minutes
_	176.0			164.0' - Fracture or mechanical break,	$\vdash$	to R3), thin black wispy	·
_	.,		NR 3	horizontal, smooth, planar, open 164.0-164.1' - Fracture zone	F	<ul> <li>organic/carbonaceous laminations, voids (&lt;1/16") over 1-3% of surface</li> </ul>	·
-			J	164.1' - Fracture, 10 deg, rough, planar 165.15, 165.2, 165.25' - Fractures (3),	I	non-uniformly distributed, few cavities, fossil molds/casts rare to	-
-				horizontal, smooth, planar, open	$\blacksquare$	absent	-
_				166.10, 166.4, 166.42, 166.45, 166.55, 166.6, 166.7, 166.8' - Bedding plane (8), horizontal,	$\Box$	148.1-149.0' - yellowish gray, (5Y 7/2), very fine grained, moderate to	-
_	R28-HQ			rough, planar, open	$\vdash$	strong HCl reaction, medium strong	Drill chatter at 178.0'
	5 ft 16%	0	NR	167.15, 167.2, 167.25, 167.3, 167.35, 167.95' - Bedding plane (6), horizontal, smooth,		to strong (R3 to R4), voids (<1/16") over <1% of surface, cavities	·
			`	planar to stepped	片	(<3/16") rare to absent, fossils	]
180				168.0' - Fracture, 10 deg, rough, undulating, open	$\vdash$	absent	]
-139.1				168.2, 168.25, 168.3, 168.35, 168.4, 168.5,	$\mathbb{H}$		R28: 4 minutes
	181.0			168.6, 168.9' - Mechanical break (8), horizontal, smooth, planar	Ш		
				• • •			
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PROJECT NUMBER:	BORING NUMBER:					_
338884.FI	E-01	SHEET	11	OF	13	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	<u> LEVELS : 3.2</u>	2 ft bgs	s on 5/	/30/07 START : 5/30/2007 END : 6	/3/200	07	LOGGER : B. Ellis	
>೧≎	- %			DISCONTINUITIES	၂ ဖွ		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
185 -144.1	R29-HC 5 ft 26%	15	Lid 2 2 2 NRR	168.5-168.6' - Fracture zone 169.0, 169.1' - Fracture or mechanical break (2), horizontal, smooth, planar, along bedding planes 171.35' - Fracture, 80 deg, smooth, planar, tight 171.8' - Fracture or mechanical break, horizontal, rough, undulating to stepped, tight 172.0' - Fracture, 80 deg, rough, planar, (possible continuation of 171.8' fracture) 172.62' - Fracture or mechanical break, horizontal, smooth, planar 172.80' - Fractures (2), 70 deg, rough, planar, tight, parallel 172.92' - Fracture, 30-60 deg, rough, stepped, tight 173.45' - Fracture, horizontal, rough, planar, open 174.3' - Fracture, horizontal, rough, planar, open 174.5-174.8' - Fracture zone, 0-60 deg, rough, undulating, open 174.5-174.8' - Fracture zone, various fracture plane orientations producing angular gravel-sized limestone rock fragments 174.85' - Fracture, horizontal, rough, planar, open 175.2' - Fracture, horizontal, rough, planar, open 175.75-175.8' - Fracture zone, 0-90 deg, rough, undulating, open 176.0-176.1' - Fracture zone, multiple irregular sized, very angular cobble-sized fragments 176.35, 176.5' - Fractures or mechanical break (2), horizontal, rough, planar, open 181.25, 181.7' - Fractures or mechanical break (2), horizontal, smooth, planar 182.05' - Fracture or mechanical break, horizontal, smooth, planar			149.0-150.0' - yellowish gray mottled with pale yellowish brown (<1% of rock surface), (5Y 7/2 mottled with 10YR 6/2), coarse grained, strong HCI reaction, weak to medium strong (R2 to R3), voids and cavities absent, abundant rip up/lithoclasts (subrounded to rounded), fossil casts/molds rare, echinoids rare 150.0-150.4' - yellowish gray, (5Y 7/2), medium grained, strong HCI reaction, weak (R2), although rock has "grainy" appearance, the interval is generally absent of voids, cavities absent, fossil (casts/molds) rare to absent  No Recovery 150.4-151.0'  Limestone 151.0-153.0' - Same as 150.0-150.4' except with some intraclasts between 151.5' and 151.9' 153.0-155.8' - yellowish gray, (5Y 7/2), fine grained, moderate HCI reaction, medium strong to strong (R3 to R4), voids up to 1/16" over 3-5% becoming more common (up to 10% below 154.5'), some cavities up to 3/4"-1-3/16" in diameter/length over 1-2% becoming more common below 154.5', some dark yellowish orange banding from 154.9-155.8', fossil (molds/casts), echinoderms rare  No Recovery 155.8-156.0'  Limestone 156.0-156.3' - variegated yellowish gray to pale brown, (5Y 7/2 to 5YR 5/2), fine grained, moderate HCI reaction, voids (1/16" or less) over 1-2% surface, cavities 3/8"-3/4"x3/16" at base of interval (elongated), very thinly laminated (argillaceous laminae), fossils rare to absent 156.3-159.1' - Same as 153.0-155.8' except lacking dark yellowish orange, (10YR 6/6), medium to coarse grained, strong HCI reaction, weak (R2), hummocky/irregular surface with 4% voids, cavities absent, fossil hash, contact sharp with undulating limestone 159.25-160.0' - very pale orange, (10YR 6/6), medium to coarse grained, strong HCI reaction, weak (R2), rods over <1%, cavities (<3/16") rare, some rip up/intraclast-like (rain, fossil casts and molds rare No Recovery 160.0-161.0'	Extensive drill chatter throughout run  R29: 7 minutes  Driller's Remark: Total of 37 flights used for total depth



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-01	SHEET	12	OF	13

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

CORING	INETHODA	ND EC	JUIPIV	IENT: CME 550X S/N 340253, mud rotary, HQ tools, F	vv cas	ınç		ORIENTATION : Vertical
WATER	LEVELS : 3.2	) ft has	on 5	/30/07 START : 5/30/2007 END :	3/3/200	17	LOGGER : B. Ellis	
WAILK	LL V LLO . J.	it by	5 011 0		<i>,,</i> 0, 200	Ť		001111
>		<u> </u>		DISCONTINUITIES	O	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	100	Г	POCK TYPE COLOR	
	Z,₹∑	_	FRACTURES PER FOOT	DEGORII HOIV	<u></u>	ı	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
# 5 E	독王씨	(%) Q	158	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC	ı	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
± 7, 8	유민정		S F	PLANARITY, INFILLING MATERIAL AND	ĕ	ı	AND ROCK MASS	SMOOTHNESS, CAVING ROD
655		RQ	8.7	THICKNESS, SURFACE STAINING, AND TIGHTNES	;   ≲	ı	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ЦОШ	0 1 1	Œ	шп		0)		0.7.4.0.10.10.100	
						Г	Limestone	
_					4	H	161.0-161.6' - Same as	-
						ı	159.25-160.0'	
					1	Г	161.6-162.5' - very pale orange,	1
_					4	L	(10YR 8/2), coarse grained, strong	_
						ı	HCl reaction, weak to medium strong	
_					-1	H	(R2 to R3), fossil hash, voids (<1/16"	-
I _						L	or less) over 3-5% of rock surface,	_
						Г	cavities rare, fossils common	
_					4	H	(echinoids, pelecypods,	-
						ı		
					1	Г	casts/molds), rip up/intraclasts	-
-					_	L	common in base of interval	
						ı	162.5-164.1' - yellowish gray mottled	
-					1	r	with moderate yellowish brown, (5Y	1
I _					1	L	7/2 mottled with 10YR 5/4), medium	1
						ı	grained, strong HCl reaction, weak to	
-					+	H	medium strong (R2 to R3), becoming	-
					_	L	finer grained with depth, voids (1/16"	
1 7					1	ſ	or less) over 3-5% of rock surface	1
-					+	H	(irregularly distributed), brown	-
						ı	mottling is wavy and discontinuous,	
					7	Г	some echinoids and fossil	1
_					4	F	molds/casts	_
						ı	164.1-165.8' - yellowish gray, (5Y	
-					1	H	7/2), fine to medium grained, strong	-
l _					1	L	HCl reaction, weak (R2), voids	_
						ı	(1/16") over 1% or less of rock,	
-					-1	H	cavities rare (1/8"-3/16" over <1%),	_
I _						L	echinoids rare, fossil molds/casts	_
					1	Г	rare to absent	
-					-	F	No Recovery 165.8-166.0'	-
						ı	Limestone	
I -					1	Γ	166.0-166.6' - Same as	1
I -					4	F	159.25-160.0'	-
						ı	166.6-169.4' - yellowish gray, (5Y	
					1	Г	7/2), fine grained, moderate HCl	-
_					4	F	reaction, medium strong (R3), voids	_
						ı	(1/16" or less) over 3-5% of rock	
-					1	r	surface, few cavities (typically 3/16"	1
1 -					1	L	or less in diameter), voids and	_
1					1	1	cavities becoming more common	
-					1	H	below 168.5' up to 20-25% voids,	-
I _					_	L	fossils (casts/molds) and echinoids	
						ı	rare to absent to 168.5', some fossil	
-					1	H	molds/casts and few echinoids below	→
						L	168.5-169.4'	
1 7					1	Γ	No Recovery 169.4-171.0'	1
-					4	F	Limestone	1 -
						ı	171.0-175.8' - yellowish gray, (5Y	
1 7					1	Γ	7/2), fine to medium grained, mild to	1 7
-					4	F	moderate HCl reaction, weak to	1
						ı	medium strong (R2 to R3), voids	
-					1	H		1
I _					4	L	(1/16" or less) over 5-10% of rock	1
						ı	surface, cavities (generally 3/16" or	
-					+	F	less in diameter) over 2-3% of	1
						ı	surface, fossil (casts/molds) rare,	
1 7					1	Γ	medium to coarse grained from	1
-					-1	H	_ 174.5-175.3'	
						ı	No Recovery 175.8-176.0'	
1 -					1	r		
					_	L		
						ı		
$\overline{}$						L		1



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-01	SHEET	13	OF	13

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723795.0 N, 457523.7 E (NAD83)

ELEVATION: 40.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

00111110	NILTHOD / C		<u> </u>	12141 . CIVIE 330X 3/14 340233, Illiad Totally	,		9		ONLINIATION: Vertical
WATER	LEVELS: 3.2	ft bgs	on 5/	/30/07 START : 5/30/2007	END : 6/3	/200	7	LOGGER : B. Ellis	
≥0.0	(9)			DISCONTINUITIES		Ğ		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		တ္ယ	DESCRIPTION		SYMBOLIC LOG		ROCK TYPE, COLOR,	
표보호	N.Y.	(%	로			임		MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
FAZE	R F S	(%) O	FS	DEPTH, TYPE, ORIENTATION, ROUGH	GHNESS,	BO		WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
E-SP	RNN	Ø	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIA THICKNESS, SURFACE STAINING, AND	L AND	¥		AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	S EE	2	표료	THICKNESS, SURFACE STAINING, AND	HIGHTINESS	Ś		CHARACTERISTICS	,
								Limestone	
-					-		H	176.0-176.35' - yellowish gray, (5Y	-
_					_		L	7/2), fine to very fine grained, mild to	_
								moderate HCl reaction, medium	
_					_		L	strong (R3), voids (1/16" or less) over 3-5% of rock surface (irregularly	1
-					-		F	distributed), cavities along bedding	-
I _							L	planes (elongate 3/8"-3/4"), fossils	_
								(casts/molds) rare to absent	
								176.35-176.8' - dark yellowish	1
-					-		F	orange, (10YR 6/6), fine grained,	-
							L	mild to moderate HCl reaction, weak	
							1	to medium strong (R2 to R3), voids (typically <1/16") over 10% of	
1 7					_		r	surface, cavities common (up to	1
-					-		H	3/8"x3/16") irregularly distributed,	1 -
-					_		F	fossil molds/casts rare	-
								No Recovery 176.8-181.0'	
1 7								Limestone	1
-					-		F	181.0-182.3' - dark yellowish orange,	1 -1
_					_		L	(10YR 6/6), very fine grained, mild HCl reaction, weak to medium strong	_
								(R2 to R3), voids (typically 1/16" or	
					_		r	less) over 3-5% of rock surface,	1
-					-		F	some cavities, arcuate to ovate (up	-
-					_		L	to 3/4"x3/16"), fossil (casts/molds)	1
								rare	
								No Recovery 182.3-186.0'	
-					-			Bottom of Boring at 186.0 ft bgs on 6/3/2007	1
_					-		F	0/3/2007	1 -
I _							L		
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PROJECT NUMBER:	BORING NUMBER:					
338884.FI	F-02	SHEET	1	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" and 6" tri-cone bits

ORIENTATION: Vertical

WATER	LEVELS	: 1.5 ft bo	gs on 5/1	8/07	START : 5/18/2007
200				STANDARD	SOIL DESCRIPTION O COMMENTS
N AND	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
39.8	0.0			( )	Topsoil (OL) Water level: 1.5-5.0'
_		1.0	SS-1	1-3-6 (9)	0.0-0.3' - grayish brown to brownish black, (5YR 3/2 to /- 5YR 2/1), wood debris and organics
_	1.5			(3)	Poorly Graded Sand (SP)
					\ \ 0.3-1.0' - grayish orange, (10YR 7/4), moist, loose, \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
_					nonplastic fines, trace fine organics and roots
_					<b>4 1</b>
_					-
-					<b>-                                     </b>
					-
5 34.8	5.0				Wood Debris And Silty Sand (SM)
-		0.9	SS-2	5-6-5	5.0-5.95' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), wet, medium dense, 30% nonplastic fines,
-	6.5			(11)	very fine to fine grained silica sand
-	0.0				<b>1</b>
					]
_					]
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-					<b>-</b>
-					-
10 <u> </u>	10.0 10.3	0.3	SS-3	50/3.5	Silty Sand (SM)
-		0.0		(50/3.5")	│ \ 10.0-10.3' - dark yellowish brown, (10YR 6/6), moist,
-					\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-					\dilatancy, bottom 1" contains fine gravel-sized   -
-					-
-					<b>- 1</b>
					]
					]
_					<b>]</b>
15 <u> </u>	15.0				Limestone
24.0				4-4-5	Limestone  15.0-15.2' - dark yellowish orange, (10YR 6/6), mild  Driller's Remark: 100% fluid loss, no circulation
-		0.8	SS-4	(9)	HCl reaction, carbonate materials  Silt With Sand (ML)
-	16.5				│ \ 15.2-15.85' - dark yellowish orange, (10YR 6/1), wet, │
-					\stiff, nonplastic, rapid dilatancy, mild to moderate HCl \reaction, carbonate materials, 20-25% fine-grained
-					silica sand
-					1 1
					] [
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PROJECT NUMBER:	BORING NUMBER:				
338884.FI	F-02	SHEET	2 0	F 11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" and 6" tri-cone bits

ORIENTATION: Vertical

WATER	LEVELS	: 1.5 ft b	gs on 5/18	8/07 5	START : 5/18/2007 END : 5/21/2007 LOGGER : P. De Sa'rego, R. Bitely
				STANDARD	SOIL DESCRIPTION COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	0071
L BEI		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
当の団 19.8				(N)	υ Install 15' HW casing to seal off flow zone
10.0 -					after collecting SS-5: 20.0-21.5' SPT
-	21.0			00.50/5	Sandy Silt (ML) Water level surface
-	21.9	0.9	SS-5	20-50/5 (70/11")	21.0-21.9' - grayish yellow to grayish orange. (5Y 8/4
-	21.9			, ,	to 10YR 7/4), moist, hard, nonplastic, moderate HCl
-					rapid dilatancy, carbonate materials / - roller and AWJ rod beyond 30.0' inside HW
_					casing
-					- Driller's Remark: Smooth, moderate to rapid - drilling rate, intermittent light chatter
-					- Unlining rate, intermittent light chatter -
25	25.0				
14.8	25.0 25.4	0.3	SS-6	50/5	Silty Sand (SM)
-				(50/5")	25.0-25.3' - grayish orange, (10YR 7/4), wet, very dense, very fine to coarse grained, mild to moderate
-					\HCl reaction, 30% nonplastic fines, trace iron
_					cemented sands, carbonate materials -
-					11
					11
					] ]
					] ]
30	30.0				
9.8	30.3	0.1	SS-7	50/4 (50/4") /	Silty Sand (SM)
_				(00/4)	\orange, (10YR 7/4), no iron cemented sands, coarse / _
_					\grained silica sand, limestone fragments
_					_
_					
_					
_					
-					4
-					4
35 4.8	35.0				Sandy Silt (ML)
		1,		29-26-50/6	35.0-36.3' - moderate yellowish brown, (10YR 5/4), -┃ │ │ │ │ │
-		1.3	SS-8	(76/12)	moist to wet, mild to moderate HCl reaction, low
-	36.5				trace fine gravel-sized limestone, carbonate materials / -
-					-   -   -   -
-					
-					
-					
-					
40					
40_					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-02	SHEET	3	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" and 6" tri-cone bits

ORIENTATION: Vertical

WATER	LEVELS	: 1.5 ft bo	gs on 5/18	3/07 5	START : 5/18/2007 END : 5/21/2007 LO	OGGEF	R : P.	De Sa'rego, R. Bitely
				STANDARD	SOIL DESCRIPTION		ڻ ا	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	RECOVE		PENETRATION TEST RESULTS 6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOG'	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
				(N)			SY	
-0.2 _ - - - - - -	40.0	0.2	SS-9	50/4 (50/4")	Limestone 40.0-40.2' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, coarse sand-sized and fine gravel-sized			- - - - - -
45	45.0					-		-
-5.2 -5.2 - - - - -	45.0	0.4	SS-10	50/5 (50/5")	Sandy Silt (ML)  45.0-45.4' - moderate yellowish brown, (10YR 5/4), wet, low plasticity, mild HCl reaction, 44% very fine medium sand-sized, carbonate materials	- to \int		
50	50.0							
-10.2 - - - - - 55 -15.2 - - - - - -	50.3	0.3	SS-11	50/4 (50/4")	Limestone 50.0-50.3' - pale yellowish brown, (10YR 6/2), mild HCI reaction, fine gravel-sized Begin Rock Coring at 51.0 ft bgs See the next sheet for the rock core log			Advance HW casing from 20.0-50.0' below ground surface to prevent circulation blow out around pit neck  Begin rock coring with NQ wireline tooling from 51' below ground surface
1	1						I	



PROJECT NUMBER:

338884.FL

BORING NUMBER:

E-02

SHEET 4 OF 11

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

ORIENTATION: Vertical

WATER	LEVELS : 1.5	ft bg	s on 5	/18/07 START : 5/18/2007 END : 5/2	21/20	D7 LOGGER : P. De Sa'rego, R. Bite	ely
≥ D ⊋	(%)			DISCONTINUITIES	စ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) O D	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 55 -15.2	51.0 R1-NQ 5 ft 96%	69	3 1 10 3	51.05, 51.2, 51.4, 52.85, 53.3' - Fractures (5), <10 deg, rough, undulating, no staining or infill, open <1/4"-<1/2"  53.5-53.55' - Soil Seam 53.7, 53.8, 54.05, 54.15, 54.6, 55.15' - Fractures (6), <10 deg, rough, undulating, open <1/4"- <3/4"		Limestone  51.0-55.8' - moderate yellowish brown, (10YR 5/4), very fine to medium grained, 51.0-53.5'  extremely weak to weak rock (R0 to R2) weakest at 51.0-51.5' and 53.3-53.5', voids <1/16" over 50-60% of surface, highly fossiliferous with many fossil molds/casts <1/2" diameter, few cavities <1/2" diameter 53.5-54.5' extremely weak to very weak (R0 to R1) with depth, voids <1/16" over <20% of surface, no fossils 54.5-55.8' weak to medium strong	Begin rock coring at 16:00 with NQ wireline tooling from 51.0' using water only SC-1 collected at 51.85- 52.85'  R1: 4 minutes
	R2-NQ 5 ft 90%	50	NR 10 >5 2 1 >10	56.15, 56.3, 56.43, 56.55, 56.7, 56.9' - Fractures (6), <10 deg, rough, undulating, open <1/2"  57.40-57.55' - Fracture zone, rough, undulating 58.2, 58.45, 59.65' - Mechanical break (3), <10 deg, rough, undulating, tight to open <1/2"		rock (R2 to R3), voids <1/16" over 40-50% of surface, secondary recrystallized infill over 50% of core zone 53.5-54.5' - extremely weak to very weak (R0 to R1), weaker with depth, voids <1/16" over <20% of surface, no fossils 54.5-55.8' weak to medium strong rock (R2 to R3), voids <1/16" over 40-50% of surface, secondary recrystallized infill over 50% of core zone 54.5-55.8' - weak to medium strong	- - - - - - R2: 3 minutes
	R3-NQ 5 ft 78%	58	>10 0 0 4 NR	undulating, gravel sized fragments <3/4" diameter 61.0-61.1' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter  64.05, 64.3, 64.5, 64.7' - Fractures (4), 40 deg, rough, undulating, tight, open <1/2"		(R2 to R3), voids <1/16" over 40-50% of surface, secondary recrystallized infill over 50% of core zone No Recovery 55.8-56.0' Limestone 56.0-60.5' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), strong HCl reaction, extremely weak to medium strong (R0 to R3), fine to medium grained, silts increasing with depth, voids 1/16" over 40% of surface, moderately fossiliferous with fossil casts/molds <3/4" diameter, many cavities <1" diameter, 20% of cavities with secondary recrystallized	SC-2 collected at 62.65-63.65'
- - - - 70 -30.2	R4-NQ 5 ft 95% 71.0	85	1 0 1 0 2	66.2, 63.25, 65.1, 65.15, 65.55' - Fractures (5), <10 deg, undulating, smooth to rough, open <1/4"		infill  No Recovery 60.5-61.0'  Limestone 61.0-64.9' - dark yellowish brown to yellowish gray, (10YR 4/2 to 5Y 7/2), very fine to medium grained, moderate to strong HCl reaction, strong (R4) 61.1-64'. At 61.0-61.1' and 64.0-64.9' extremely weak to very weak (R0 to R1), voids <1/16" over 30% of surface, trace fossil molds/casts <1/2, cavities with secondary recrystallized in fill up to 2" diameter; trace organics No Recovery 64.9-66.0'	



PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-02

SHEET 5 OF 11

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS : 1.5	ft bg	s on 5	/18/07 START : 5/18/2007 END : 5/	2 <u>1/2</u> 0	07 LOGGER : P. De Sa'rego, R. Bitel	ly
>00	(6			DISCONTINUITIES	ß	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - - 75 -35.2	R5-NQ 5 ft 90%	48	NR) 10  1  >10  5  1	71.05, 71.2, 71.65, 71.7' - Fractures (4), <10 deg, rough, undulating, open <1/4"-1/2", few intersecting fractures, 71.65-71.7'  72.4, 73.05, 73.25, 73.65' - Fractures (4), <10 deg, rough, undulating, open <1/4"  73.8-73.9' - Fracture zone, rough, undulating, gravel-sized fragments, <1" diameter 74.3, 74.4, 74.55, 74.7, 74.8, 75.15' - Fractures (6), <10 deg, rough, undulating, except 74.7-70.0' deg intersecting, tight, open <1/4"		Limestone  66.0-70.75' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate to strong HCl reaction, weak rock (R2) with extremely weak rock (R0) lenses <0.1' thick rock at 66.2', 67.0', 67.45', 67.65', voids <1/16" over 30% of surface, few cavities <1" diameter, poorly fossiliferous  No Recovery 70.75-71.0' Limestone  71.0-75.5' - moderate yellowish brown, (10YR 5/4), very fine to	NQ wireline lowered in boring at 76.0', backhammer 5/19/07 17:15 76.0' Water level at surface R5: 3 minutes
	76.0 R6-NQ 5 ft 78%	63	>10 10 4 3	75.3' - Clay seam  76.4, 76.9' - Fracture (2), <10 deg, undulating, smooth to rough, tight, open <1/2"  76.9-77.15' - Fracture zone, rough, undulating, gravel-sized fragments, <1-1/2" diameter  78.45-78.5' - Fractures (3+), rough, undulating, intersecting  78.9, 79.35, 79.45' - Fractures (3), <10 deg, rough, undulating, tight, open <1/4"		medium grained, moderate to strong HCl reaction, interbedded extremely weak to very weak rock (R0 to R1), with weak to medium strong rock (R2 to R3), voids <1/16" over 0-30% of surface, variable, trace fossil molds, few cavities <1/2" diameter, trace secondary recrystallized infill No Recovery 75.5-76.0' Limestone 76.0-79.9' - moderate yellowish brown to medium light gray, (10YR 5/4 to N6), very fine to medium grained, 76.0-78.3' medium strong to strong rock (R3-R4), void <1/16"	05/20/07 08:00 Continue advancing HW casing from 50.0 to 65.0'  10:30 NQ tooling freed at 76.0' with HW casing at 65.0', continue rock coring from 76.0' SC-3 collected at 77.15-78.3'
- - - - - 85 -45.2	81.0 R7-NQ 5 ft 96% 86.0	65	10 3 4 >10 3 NR	81.3-81.45' - Fracture zone (5+ intersecting), rough, undulating 82.0-82.1' - Fracture zone (3+ intersecting), rough, undulating 82.9' - Fracture, 20 deg and 50 deg, rough, undulating, tight 83.4, 83.5, 83.6, 83.65, 83.85' - Fractures, <10 deg, undulating, organic staining, smooth to rough, <1/2" organic clay infill, tight, open <1/2" 84.4-84.7' - Fracture zone, rough, undulating, gravel-sized fragments <1" diameter 85.7-85.8' - Fractures (3+), rough, undulating,		over <10-20% of surface increasing with depth, poorly fossiliferous, no cavities, 78.3-78.45' Fat Clay (OH), dark gray (N3), high plasticity, high organic content, no HCI reaction, 78.45-79.9' weak to medium strong rock (R2-R3), fine to medium grained, voids <1/1/6" over <10-40% of surface, poorly fossiliferous, secondary recrystallized infill of cavities over 40% of surface, strong HCI reaction No Recovery 79.9-81.0' Limestone 81.0-85.8' - pale yellowish brown, (10YR 6/2), very fine to medium grained, weak to medium strong rock	R7: 5 minutes
- - - - - 90 -50.2	R8-NQ 5 ft 72% 91.0	6	6 6 >10 2 NR	open <1/2" 86.3, 86.45, 86.55, 86.6' - Fractures, 40 deg and 60 deg, rough, undulating, open <1/2" 86.8, 86.85, 87.0, 87.2, 87.4, 87.65' - Fractures, <10 deg, rough, undulating, open <1/2" 87.8, 87.95' - Fractures (2), 40 deg and 60 deg, rough, undulating, open <1/4" 88.25-88.65' - Fracture zone, rough, undulating, gravel-sized fragments, <1" diameter 88.85, 89.1, 89.4' - Fractures, 10 deg and 40 deg, rough, undulating, open <1/4"		(R2 to R3) except 83.4-83.85', grayish black, (N2), extremely weak to very weak rock (R0 to R1) with interbedded organic fat clay seams and laminations, 81.0-83.4' and 83.85-85.8' voids <1/16" over 30-50% of surface, few cavities with secondary recrystallized infill, 2" diameter at 81.9 to 82.0', poorly to moderately fossiliferous with molds <1/2" diameter, trace organics, strong to moderate HCI reaction No Recovery 85.8-86.0'	R8: 4 minutes



PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-02

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS : 1.5	ft bgs	s on 5	/18/07 START : 5/18/2007 END : 5/	21/20	D7 LOGGER : P. De Sa'rego, R. Bite	ly			
				DISCONTINUITIES	ŋ	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
-				>10	91.0-91.4' - Fracture zone, <10 deg, rough, undulating, gravel-sized fragments, no stain or infill, <1" diameter 91.65' - Fracture, <10 deg, rough, undulating, tight		Limestone  86.0-89.6' - yellowish gray, (5Y 7/2), very fine to coarse grained, extremely weak to weak (R0 to R2), voids 1/16" over 20% of surface.	-		
-	R9-NQ 5 ft	59	0	92.2' - Fracture, 40 deg, rough, undulating, tight, open <1/4" 92.6, 92.85, 92.95' - Fractures (3), <10 deg,		poorly fossiliferous  87.8-89.6' - medium gray (N5) to  olive gray (5Y 4/1), medium strong	-			
-	90%	39	2	rough, undulating, silt and/or clay sized infilling, trace of silt infill at 92.6', open <1" 93.4-93.65' - elastic silt (MH) seam	ay sized to strong rock (R3 to R4), very fine-grained, voids 1/16" over	<u>-</u>				
95 <u> </u>			4	94.55, 95.1' - Fractures (2), horizontal, rough, undulating, 80 deg intervals, open <1/2"	Ħ	highly fossiliferous with many fossil molds <1/2" diameter, few cavities <1" diameter, moderate to strong HCl	R9: 7 minutes			
-	96.0		NR 3	96.4, 96.5, 96.95, 97.35, 97.6, 97.7, 98.05,		reaction No Recovery 89.6-91.0' Limestone	-			
-						3	98.2, 98.4, 98.55, 98.65, 98.7, 98.8, 100.4, 100.7, 100.9, 101.05, 101.1, 101.15' - Fractures (19), <10 deg, rough, undulating,		91.0-93.4' - pale yellowish brown to yellowish gray, (10YR 6/2 to 5Y 7/2), very fine to fine grained, medium strong to strong (R3 to R4), 91-93.4'	- -
-	R10-NQ 5 ft 100%	52	8	tight, open <1/4"		and 93.65-94.5' voids <1/16" over 30% of surface, 91-92.5',92.65-93.4', 93.65-94.5' no voids, few cavities	- -			
100			0			<pre>&lt;1/2" diameter, poorly fossiliferous  Elastic Silt (MH) 93.4-93.65' - olive gray, (5Y 4/1),</pre>	SC-4 collected at 98.85- 100.0'			
-60. <u>2</u>	101.0		6		Ħ	medium plasticity, strong HCl reaction  Limestone	R10: 4 minutes			
-			>10	101.2, 101.25, 101.3, 101.35, 101.4, 101.7, 101.95, 102.45, 102.5, 102.55, 102.6, 102.65, 102.7, 102.75, 103.25, 103.35, 103.4, 103.5,	Ē	94.5-95.5' - yellowish gray, (5Y 7/2), - strong HCl reaction, extremely weak to weak (R0 to R2), voids <1/16" over <20% of surface, moderately	- -			
-	R11-NQ		10	103.65, 103.7, 103.9, 103.95, 104.0, 104.15, 104.2, 104.3, 104.35, 104.4, 104.45, 104.5' - Bedding plane (30), <10 deg, undulating,		fossiliferous with molds/casts <1/2" diameter  No Recovery 95.5-96.0'	- -			
-	5 ft 99%	16	10	smooth to rough, tight, open <1/2"	Ħ	<ul> <li>Limestone</li> <li>96.0-101.0' - yellowish gray, (5Y 7/2),</li> <li>very fine to fine grained, strong HCl</li> </ul>	-			
105 -65.2			>10	104.9, 105.0, 105.2, 105.25, 105.3, 105.35, 105.7, 105.8' - Bedding plane (11), <10 deg,		reaction, weak to very weak rock (R1 to R2), silt zone from 96.5-96.95', voids <1/16" over <20-30% of surface, moderately fossiliferous.	R11: 4 minutes			
-	106.0		10 (NR) 2	undulating 106.1, 106.8, 109.1, 109.25, 109.3, 109.55,		with fossil molds/casts <1" diameter, no cavities Limestone	- -			
-			0	109.7, 109.8, 109.85, 110.3, 110.5, 110.6, 110.65, 110.85, 110.95' - Bedding plane (15), <10 deg, undulating, smooth to rough, tight, open <1/4"		101.0-105.95' - yellowish gray, (5Y 7/2), very fine to fine grained, extremely weak to weak rock (R0 to	SC-5 collected at 106.85- 107.9'			
-	R12-NQ 5 ft	62	>10	108.1-108.45' - Fracture zone, rough, undulating, gravel-sized fragments, <2"		R2), voids <1/16" over <20% of surface, poorly fossiliferous, laminated, strong HCl reaction No Recovery 105.95-106.0'	-			
-	100%		10	diameter	Ħ	-	- -			
110_ -70.2 -	111.0		10		Ħ		R12: 5 minutes			



PROJECT NUMBER:	BORING NUMBER:					-
338884.FL	E-02	SHEET	7	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS : 1.5	ft bgs	s on 5	/18/07 START : 5/18/2007 END : 5/	21/20	07 LOGGER : P. De Sa'rego, R. Bite	ly		
≥0≎	(%)			DISCONTINUITIES	စ္ခ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
-			>10	111.1-111.2' - Fracture zone, undulating, gravel-sized fragments <1" diameter, smooth to rough 111.65-112.15' - Bedding plane, <10 deg,		Limestone  - 106.0-111.0' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1	-		
-	R13-NQ		>10	rough, undulating, tight 112.25, 112.5, 112.65, 112.7, 112.8' -		<ul> <li>to R2), voids &lt;1/16" over &lt;20% of surface, moderately fossiliferous with molds &lt;1" diameter, laminated</li> </ul>	-		
-	5 ft 79%	22	>10	Bedding plane (5), <10 deg, undulating, smooth to rough, tight  112.85-114.2' - Fracture zone, and bedding	Ħ	Limestone     111.0-114.95' - yellowish gray, (5Y     7/2), very fine to fine grained, strong	-		
115 -75.2					>10	plane, gravel-sized fragments <1-1/2" diameter 114.8' - Bedding plane, <10 deg, smooth, —	Ė	HCI reaction, extremely weak to weak (R0 to R2), laminated, voids 1/16" over <10% of surface, no	- D42: 4 minutes
-75.2	116.0		NR	undulating, open <1/2" - -	Ħ	- fossils No Recovery 114.95-116.0'	R13: 4 minutes		
-			1	116.15, 118.5, 118.95, 120.65' - Fractures (4), <10 deg, rough, undulating, tight		Limestone 116.0-121.0' - yellowish gray, (5Y 7/2), very fine to medium grained,	_		
-	R14-NQ 5 ft 100%		0		Ħ	very weak to weak rock (R1 to R2), voids <1/16" over <10-15% increasing at 118.5', highly	-		
-		97	2	-		fossiliferous, few cavities <1-1/2"  diameter, strong HCl reaction	-		
			0	- -	Ħ	_	-		
-80. <u>2</u> -	121.0		1		H	-	R14: 3 minutes		
-			2	121.35, 121.5, 122.5, 122.8, 130.0' - Bedding plane (5), <10 deg, rough, undulating, tight	Ħ	Limestone 121.0-125.05' - pale yellowish brown to yellowish gray, (10YR 6/2 to 5Y	-		
-			2	-	Ė	7/2), very fine to medium grained, very weak to weak rock (R1 to R2), voids <1/16" over <20% of surface,	-		
-	R15-NQ 5 ft 81%	70	0	-	Ħ	highly fossiliferous at 122.5-124.1', - strong HCl reaction -	-		
125_			0	_	Ħ	_			
-85. <u>2</u> -	126.0		NR			No Recovery 125.05-126.0' - 	R15: 4 minutes		
-			2	126.0-126.1' - Fracture zone, rough, undulating, gravel-sized fragments, tight 126.8' - Fracture, <10 deg, rough, undulating,	Ė	Limestone 126.0-131.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very	- SC-6 collected at 126.85-		
-			1	open <1/2"  127.9, 130.3' - Fractures (2), <10 deg, rough,		fine to medium grained, strong HCI reaction, very weak to weak (R1 to R2), moderately to highly	127.95'		
-	R16-NQ 5 ft 97%	93	0	undulating, tight, open <1/4"	E	fossiliferous molds <1" diameter, voids <1/16" over 30% of surface, trace laminated bedding	_		
130_			0			_	- D40: 2 minutes		
-90. <u>2</u> _	131.0		1		Ė		R16: 3 minutes		



PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-02

SHEET 8 OF 11

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS : 1.5	ft bg	s on 5	/18/07 START : 5/18/2007 END : 5/	21/20	D7 LOGGER : P. De Sa'rego, R. Bite	ly
>00	6)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ZES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B	E RU GTH, OVE	(%) Q	CTUF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	R Q	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
			NR/	131.1, 131.4, 131.5, 131.85, 132.3, 132.4,		Limestone	
			6	132.55, 132.6, 132.75, 132.85, 133.25, 133.55, 133.75, 133.9, 134.0, 134.3, 134.35,	ightharpoons	<ul> <li>131.0-135.6' - yellowish gray, (5Y</li> <li>7/2), very fine to medium grained,</li> </ul>	]
l -			6	134.45, 134.5, 134.7, 134.85, 134.9, 140.15, 140.45' - Bedding plane (24), 40 deg,	Д	strong HCl reaction, extremely weak  - to weak (R0 to R2), voids <1/16"	
_	5.5.10			undulating, smooth to rough, tight, open <1/2"	Ш	over <20% of surface, poorly to moderately fossiliferous with fossil	_
_	R17-NQ 5 ft	22	5		Ш	<ul> <li>molds, &lt;1" diameter, few cavities</li> </ul>	_
-	92%					with secondary infill <2" diameter, trace laminated bedding	-
			7		$\pm$	- -	_
135_ -95.2			2	_		<u> </u>	R17: 4 minutes
-	136.0		NR		$\vdash$	_ No Recovery 135.6-136.0'	-
-	100.0			136.1, 136.4, 136.6, 137.0, 137.05, 138.5,	F	Limestone	
_			4	139.65, 139.75, 139.8, 139.85, 139.95, 140.2' - Bedding plane (12), <10 deg, rough,	H	<ul> <li>136.0-140.75' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very</li> </ul>	
			2	undulating, tight, open <1/4"	Ħ	fine to medium grained, strong HCI reaction, very weak to weak (R1 to	
				137.7, 138.25' - Fracture (2), 30 deg, rough,	Ħ	R2), 140.0-140.75' medium strong to	
_	R18-NQ 5 ft	60	2	undulating, tight, open <1/4"	L'	strong rock (R3 to R4), voids <1/16"  - over <10% of surface, poorly to	_
_	95%				H	moderately fossiliferous, laminated bedding 136.1-136.6', trace	_
_			5		H	<ul> <li>secondary infill, 140.2-140.75'</li> </ul>	_
140 -100.2				_	Ł	cavities over 30% of surface (50% of which have secondary recrystallized	R18: 5 minutes
-	141.0		1		世	infill) <1-1/2" diameter	7
-	141.0		NR		L	No Recovery 140.75-141.0'     Limestone	-
-			0		$\perp$	141.0-145.75' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very	-
_			1		$\vdash$	fine to medium grained, strong HCl	
			2	142.65, 142.95, 143.3, 143.5, 143.9, 145.45' -		reaction, medium strong to strong (R3 to R4), very weak rock (R1)	]
_	R19-NQ 5 ft	70	3	Fractures (6), <10 deg, rough, undulating, open <1/4" to 1/2"	$\perp$	145.55-145.75', voids <1/16" over <20-40% of surface, many cavities	
_	95%				Щ	<1" diameter, highly fossiliferous,	_
_			10	144.15-144.25' - Fracture zone, rough, undulating, gravel-sized fragments <1/2"	Ш	trace laminated bedding, <30% cavities with secondary recrystallized	_
145_ -105.2				diameter —	口	infill	R19: 6 minutes
-	146.0		2	145.55' - Fracture, <10 deg, rough,	仜		-
-	146.0		NR	undulating, open <1"	口	No Recovery 145.75-146.0' Limestone	-
-			2	146.1, 146.2, 147.35, 149.25' - Bedding plane (4), <10 deg, rough, undulating, tight, open	仜	146.0-150.4' - yellowish gray, (5Y 7/2), fine to medium grained, strong	-
			_	<1"	口	HCl reaction, weak (R2), moderately	
			1		上	fossiliferous with molds <1/2" diameter, sandy silt (ML) lenses	SC-7 collected at 147.35- 148.55'
	R20-NQ 5 ft	80	0		$\vdash$	146.0-146.1' and 1/2" at 150.25'	]
_	88%	- 50			$\vdash$	- -	
_			1		F	-	_
150 -110.2			>10	_	F	<u> </u>	R20: 5 minutes
-			NR		H	No Recovery 150.4-151.0'	- TAZO. O Militateo
	151.0				Ħ		
					1		



PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-02

SHEET 9 OF 11

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS: 1.5	ft bg	s on 5	/18/07 START : 5/18/2007 END : 5/	21/20	07 LOGGER : P. De Sa'rego, R. Bite	ly
≥∩≘	(%)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
155 -115.2	R21-NQ 5 ft 86%	48	1 1 5 >10 >10 NR	150.25-150.35' - Fracture zone, rough, undulating, gravel-sized fragments <1" diameter 151.3, 152.4, 153.2, 153.3, 153.35, 153.85' - Bedding plane (7), <10 deg, undulating, rough to smooth, tight, open to <1/4" 154.0-155.3' - Bedding plane, rough, undulating, intersecting vertical fractures, tight, open <1/2"		Limestone  151.0-155.3' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to medium grained, very weak to medium strong (R1 to R3), rock strength weakening with depth, 151.0-153.5' voids <1/16" over <10% of surface, few cavities with secondary recrystallized infill, poorly to moderately fossiliferous with fossil molds <1/2" diameter, very fine to fine grained, 153.5-154.0' laminated with organics, recrystallized fine to medium grained texture, 154.0-155.3' fine to medium	R21: 7 minutes
160 -120.2	R22-NQ 5 ft 100%	70	1 2 9 5	156.1, 157.75, 158.0, 158.05, 158.1, 158.15, 158.2, 158.6, 158.7, 158.75, 158.95, 159.05, 159.2, 159.35, 159.7, 159.8' - Bedding plane (16), <10 deg, undulating, rough to smooth, tight, open <1/4"		grained, <10% voids, no cavities, very weak rock (R1), 151.0-153.0' mild HCl reaction, 153.5-155.3' strong HCl reaction No Recovery 155.3-156.0' Limestone 156.0-161.0' - very pale brown to yellowish gray, (10YR 6/2 to 5Y 7/2), fine to medium grained, extremely weak to weak rock (R0 to R2) weakening with depth, 156.0-158.0' fine to medium-grained, voids <1/16" over <10% of surface, poorly to moderately fossiliferous, molds <1/2" diameter, trace secondary infill of	R22: 5 minutes
165 -125.2	R23-NQ 5 ft 98%	0	>10 >10 >10 >10 10	rough, undulating, intersecting, open <1/4" 161.0-164.7' - Bedding plane, <10 to 90 deg, undulating, intersecting vertical fractures, rough to smooth  164.95, 165.2, 165.55, 165.7, 165.75, 165.35, 165.9' - Bedding plane (7), undulating, rough to smooth, tight, open <1/4"		very fine-grained material, 158.0-161.0' fine grained, trace voids, poorly to moderately fossiliferous with fossil molds <1/4" diameter, trace secondary infill, strong HCl reaction  Limestone 161.0-165.9' - yellowish gray to yellowish gray, (5Y 7/2 to 5Y 8/1), fine to medium grained, extremely weak to weak (R0 to R2), trace voids, no cavities, trace laminate at — 165.4-165.5', poorly fossiliferous with fossil molds <1/2" diameter, strong HCl reaction, hardness strengthens with depth, trace medium strong	SC-8 collected at 163.15- 164.05'
170	R24-NQ 5 ft 1 89%	53	>10 >10 1 >10 5 NR	166.6, 166.65, 167.3, 167.35, 167.5, 168.15, 169.05, 169.2, 170.05, 170.15, 170.5, 170.35,		lenses <1/2" thick  No Recovery 165.9-166.0'	R24: 10 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-02	SHEET	10	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS : 1.5	ft bgs	on 5/	/18/07 START : 5/18/2007 END : 5/2	21/20	007	LOGGER : P. De Sa'rego, R. Bite	ly
<b>₹</b> □₽	(%)			DISCONTINUITIES	FOG		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LC		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_			0	171.2-171.3' - silt lens		ŀ	Limestone 166.0-170.45' - dark yellowish brown to pale yellowish brown, (10YR 4/2 to	-
-			4	172.1, 172.35, 172.6, 173.15, 173.35, 173.4, 173.6, 174.1' - Bedding plane (8), <10 deg,		┨	10YR 6/2), very fine to fine grained, grains becoming more coarse with depth	-
-	R25-NQ 5 ft 86%	47	10	rough, undulating, tight, open <1/2" 172.75, 174.5' - Fractures (2), 50 deg and 40 deg, rough, undulating, tight, open <1/4" -			166.0-169.4' very fine to fine-grained, becoming more coarse with depth, weak to strong rock (R2 to R4)	-
- - 175	0070		10	173.6-173.65, 173.8-173.85, 174.0-174.1' - silt/sand silt (ML) lenses -		1	interbedded, <1/2" thick silt/sand (carbonate) at 166.65', <10% voids, few cavities/recrystallized cavities	-
-135.2 -	176.0		0 NR		H	T	<1" diameter, gradational contact to extremely weak rock (R0) at 169.3-169.4' laminated,	R25: 11 minutes
-	176.0		10	- 176.2, 176.25, 176.4, 176.9, 176.98, 177.1, 177.3, 178.55, 178.9, 179.25, 179.4, 179.5,		}	169.3-169.7' extremely weak rock (R0) to poorly competent silts/sand (carbonate), laminated, friable,	-
-			10	179.6, 179.8' - Bedding plane, <10 deg, rough, undulating, tight, open <1/2" 176.7-176.8', 177.6-177.9' - silt seams	Ħ		169.7-170.45' very fine to fine-grained, medium strong to stong rock (R3 to R4), trace voids, no	-
_	R26-NQ 5 ft 84%	16	10	- 178.25-178.35, 179.6-179.7' - Fracture zone (2), rough, undulating, gravel-sized fragments		Į.	cavities, trace fossils, moderate HCl reaction No Recovery 170.45-171.0'	- -
- - 180			>10	<1" diameter  179.35' - Fractures (2+), vertical, smooth, undulating, vertical, tight		+	Limestone 171.0-175.3' - pale yellowish brown, (10YR 6/2), very fine to fine grained,	- -
-140.2 -	181.0		0 NR	179.95' - Fractures (2+), <10 deg and 40 deg, rough, undulating, intersecting, open <1/2" -			171.0-173.6' weak to strong rock (R2 to R4), 1" silt (ML) lens at 171.2-171.3' - voids <1/16' over	R26:9 minutes
-			2	-		Г	<20% of surface, variable, poorly fossiliferous, moderate odor, laminated organics in silt lens,	SC-9 collected at 181.0- 181.8'
-			>10	181.8, 181.95, 182.1, 182.25, 182.5, 182.8, 182.9, 183.1, 183.25, 183.4, 183.8, 184.0, 184.3, 184.4, 184.45' - Bedding plane (15),		1	moderate HCl reaction, 173.6-174.1' - interbedded silt (ML) lenses, extremely weak rock (R0), strong	-
-	R27-NQ 5 ft 84%	16	>10	<10 deg, rough, undulating, tight, <1/2" 182.05, 182.2, 182.4, 182.7, 182.85' - Fractures (5), rough, undulating, open <1/2"		1	odor, strong HCl reaction, 174.1-175.35' - medium strong to strong rock (R3 to R4), <10% voids	-
- - 185			>10	184.1-185.0' - Fracture zone, rough, undulating, gravel-sized fragments <1"	H	Γ	<1/16", few cavities with secondary recrystallized infill <1" diameter, moderate odor, moderate to strong HCI reaction	-
-145 <u>.2</u> -	186.0		1 NR	185.05' - Fractures, 40 deg, rough, undulating, open <1/4"		-	No Recovery 175.3-176.0' Limestone 176.0-180.2' - light olive gray, (5Y	R27: 8 minutes
_				-		Н	5/2), very fine to fine grained, medium strong to strong except soil seams (R4 to R5), voids <1/16" over	-
-				-			0-15% of surface, variable, poorly fossiliferous, few cavities <1/2" diameter, moderate to strong HCI	_
-				-			reaction, moderate odor, 176.7-176.8', 177.6-177.9' - sandy silt (ML), extremely weak rock (R0)	]
-				- -			interbedded, laminated with organics, strong odor, moderate HCl reaction No Recovery 180.2-181.0'	-
_					_			-



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-02	SHEET	11	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724255.5 N, 457486.3 E (NAD83)

ELEVATION: 39.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	WATER LEVELS: 1.5 ft bgs on 5/18/07			/18/07 START : 5/18/2007	END : 5/2	1/200	7 LOGGER : P. De Sa'rego, R. Bite	ely
>00	(9			DISCONTINUITIES		<sub>O</sub>	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGH PLANARITY, INFILLING MATERIAL THICKNESS, SURFACE STAINING, AND T	AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
							Limestone  181.0-185.2' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine to medium grained, grains becoming more coarse with depth, weak to strong rock (R2 to R4), voids <1/16" over 0-30%, poorly fossiliferous 181.0-183.5', 183.5-185.2' - moderately to highly fossiliferous with molds <1/2" diameter, 182.95-183.4' - laminated, few cavities with secondary recrystallized infill, 183.0-185.2', mild to moderate HCI reaction increasing with depth  No Recovery 185.2-186.0'  Bottom of Boring at 186.0 ft bgs on 5/21/2007	



1	PROJECT NUMBER:	BORING NUMBER:					
	338884.FL	E-03	SHEET	1	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724208.2 N, 457932.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.9 ft bo	gs on 5/07	7/07	START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki
300				STANDARD	SOIL DESCRIPTION COMMENTS
ANC (# CO	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, TELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
42.0	0.0				Topsoil
		1.0	SS-1	1-2-3 (5)	\( \( \text{\ 0.0-0.1'} \) \( \text{Silty Sand (SM)} \)
	1.5			(-)	0.1-1.0' - dusky yellowish brown to dark yellowish brown, (10YR 2/2, 10YR 4/2), moist, loose, fine Begin E-03 at 11:27 05/07/2007; HW surface casing used in boring
					grained, 15-20% non plastic fines, silica sand
-	-				<b>-</b>
-	-				-
-	1				-
-					-
5	5.0				<b>-</b>
37.0	3.0				Clayey Sand (SC)
-		0.5	SS-2	1-2-2 (4)	5.0-5.5' - greenish gray, (5G 6/1), moist, very loose, 21% fines, 1/2" limestone fragments between 5.3' and
	6.5			( · /	5.6' with mild HCI reaction, no HCI reaction in clay
-					
-	-				-
-	-				-
-	1				-
-	1				-
10	10.0				<b>†  </b>
32.0	10.0				Silt With Sand (ML)
-	1	1.0	SS-3	5-18-30 (48)	10.0-10.95' - pale yéllowish orange, (10YR 8/6), moist, hard, nonplastic, rapid dilatancy, mild HCl
	11.5			(40)	reaction, 20% very fine to medium sand, carbonate / -
_					Indicitals
-					<u> </u>
-	-				-
-	-				-
-	1				-
15	15.0				1
27.0	15.3	0.1	SS-4	50/3 (50/3")	Limestone Fragments
-				(50/3")	Limestone Fragments 15.0-15.1' - grayish orange, (10YR 7/4), mild to moderate HCl reaction, fragments to 1/2"
-					]
-	4				] ]
-	-				
-	-				
-	-				-
20	1				1
					11



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-03	SHEET	2	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724208.2 N, 457932.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 2.9 ft bo	gs on 5/07	7/07 S	START : 5/7/2007 END : 5/8/2007 LC	OGGER	: N.	Jarzyniecki
				STANDARD	SOIL DESCRIPTION		G	COMMENTS
LOW AND	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	0011 111115 11000 0000 0000		CO	DEPTH OF CACING TOWN
DEPTH BELOW SURFACE AND ELEVATION (#)		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EPT JRF/			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	Y	YMB	INSTRUMENTATION
22.0	20.0	0.0	SS-5	(N) 50/3	_ No Recovery 20.0-20.3'		S	
	20.0	0.0		(50/3")	No necovery 20.0-20.0			-
-						-		-
-						-		-
-						-		-
-						-		-
-						-		<del>-</del>
-						-		<del>-</del>
-						-		-
-	05.0					_		-
25 <u> </u>	25.0 25.5	0.4	SS-6	50/5.5	Sandy Silt (ML)		Ш	_
-	25.5	0.1	000	(50/5.5")	25.0-25.4' - palé yellowish orange, (10YR 8/6), wet, hard, low plasticity, rapid dilatancy, mild HCl reaction	, /=		-
-					\49% fine to medium grained sand	ווכ, / –		-
-								-
-						-		-
-						_		
_						_	l	_
_						-		_
-						_	l	_
30	30.0					_	1	_
12.0	30.5	0.3	SS-7	50/5.5 (50/5.5")	Sandy Silt (ML) 30.0-30.25' - Same as 25.0-25.4'		Ш	_
				(50/5.5)	\30.0-30.25 - Same as 25.0-25.4	/ ]		
						_		
_						_		<u>_</u>
_						_		_
_						_		_
-						_		_
-						-		-
35 7.0	35.0			00 50/0	→ Limestone Fragments			_
'.0 -	35.8	0.2	SS-8	26-50/3 (76/9")	Limestone Fragments 35.0-35.15' - moderate yellowish brown, (10YR 5/4' mild HCl reaction, sand with limestone fragments	), /-		-
-				. ,	\mild HCl reaction, sand with limestone fragments	/ -		-
-						-		-
-						-		-
-						-		-
-						-		-
-						-		-
-						-		-
40						-		-
40_								



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-03	SHEET	3	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724208.2 N, 457932.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.9 ft bo	gs on 5/07	7/07	START : 5/7/2007 END : 5/8/2007 LOGGEF	R : N.	Jarzyniecki
<u> </u>				STANDARD	SOIL DESCRIPTION	ű	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME LICCO CROUD CVAROU COLOR	SYMBOLIC LOG	DEDTILOF CACING POULING DATE
H BE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	BOLI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYM	INSTRUMENTATION
2.0	40.4	0.4	SS-9	50/5	Sandy Silt (ML)	Ш	
				(50/5")	40.0-40.4' - moderate olive brown, (5Y 4/4), wet, hard, low plasticity, rapid dilatancy, mild HCl reaction, 49%		]
_					fine to coarse grained sand, carbonate material		]
_					<u>.</u>	1	_
-					-	1	
-					-	-	-
-					-	┨	-
-					-	1	1
45	45.0				-	1	1
-3.0		0.6	SS-10	42-50/3	Sandy Silt (ML) 45.0-45.6' - Same as 40.0-40.4' except 5-10% fine		]
-	45.8			(92/9")	gravel-sized limestone fragments	<b>T</b> '''	1 ]
-						1	
-					-	-	-
-					-	┨	-
-					-	1	-
-						1	1
					-	1	1
50	50.0						
-8.0	50.3	0.0	SS-11	50/3 \ (50/3") /	No Recovery 50.0-50.3'	╁	Driller's Remark: Drill chatter
-					-	┨	-
-					-	1	-
-					-	1	-
-					·	1	1
							]
							]
-						1	
55 <u> </u>	55.0 55.3	0.0	SS-13	50/2	\ Limestone Fragments	╄	-
-		<u> </u>	30 .0	(50/2")	55.0-55.05' - moderate olive brown, (5Y 4/4), mild HCl reaction, fragments to 1/4"	$\mathbf{f}$	-
-					reaction, fragments to 1/4	1	1
-					·	1	1
							]
_	60.0	0.1	00.46	F0 /0	N- D	L	]
-	60.1	0.1	SS-12	50/3 \ (50/3")	No Recovery 60.0-60.1' one 1/2" limestone fragment	-	-
-						$\mathbf{I}$	Water level at 2.9' below ground surface at
60					-	ł	17:31 -
					Begin Rock Coring at 60.0 ft bgs	t	
1					See the next sheet for the rock core log	1	



PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-03 SHEET 4 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724208.2 N, 457932.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS: 2.9	ft bgs	s on 5/	07/07 START : 5/7/2007 END : 5	/8/200	LOGGER : N. Jarzyniecki	
≥∩≘	_ ;			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
AAGE	J. F. F.	D (%)	T.00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	S Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
무유의	ORE CO	RQD	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-18.0		22	ΗД	THIORNEGO, GON AGE GTAINING, AND HOTTINEGO	S		
-10.0	60.0 R1-NQ 1 ft	100	1	60.45' - Bedding plane, 15 deg, rough,	世	Limestone - 60.0-60.7' - light olive gray, mottled	Begin rock coring at 07:47 05/08/2007; water level at
	61.0 100%			undulating	Ш	moderate olive brown, (5Y 5/2,	3.9' below ground surface
			1	61.2, 63.95' - Mechanical break	Щ	mottled 5Y 4/4), very fine to fine rational grained, weak to medium strong (R2)	R1: 2 minutes
			·	61.7, 62.2' - Fracture, 75 deg, rough,	Ш	to R3), poorly fossiliferous, voids	_
l _			2	undulating	Н	<1/16", 15-25% coverage 60.7-61.0' - Same as 60.0-60.7'	_
_				62.8' - Bedding plane, <5 deg, rough,	耳	except highly fossiliferous with casts	
	R2-NQ	25	3	undulating		and molds up to 1/2" - 61.0-65.3' - light olive gray and	
	5 ft 86%	25	3	63.0' - Bedding plane, 35 deg, rough, undulating, open up to 1/4"	Ж	moderate olive brown, (5Y 5/2, 5Y	
_				63.15' - Bedding plane, <5 deg, smooth,	Ш	4/4), fine to medium grained,	
65	1		3	planar 63.25' - Bedding plane, <5 deg, rough,	Ш	<ul> <li>moderate to strong HCl reaction, weak to medium strong (R2 to R3),</li> </ul>	]
-23.0	1		0	undulating	1-1	voids <1/16" with 10% coverage on	R2: 3 minutes
-	66.0		NR	64.25' - Bedding plane, <5 deg, rough,	Ħ	<ul> <li>surface, extremely weak (R0) rock at 61.2' and 63.95', medium strong (R3)</li> </ul>	
-	00.0			undulating, open up to 1/4" 64.65' - Bedding plane, <5 deg, rough,	Ш	at 61.8'	SC-1 collected at 66.0-
-	-		1	undulating, open up to 1/4"	╁┼	L No Recovery 65.3-66.0 Limestone	66.9'
-	-			64.8' - Fracture, 80 deg, rough, undulating, open	ш	66.0-67.8' - light olive gray, (5Y 5/2),	-
-			>10	66.9' - Bedding plane, <5 deg, rough,	世	<ul> <li>very fine to fine grained, moderate</li> <li>HCl reaction, medium strong to</li> </ul>	-
-	R3-NQ			undulating, open up to 1/4" 67.3-67.5' - Fracture zone, up to 1-1/2"	╁┼	strong (R3 to R4), voids <1/16" with	-
-	5 ft	34	>10	fragments, intersecting fractures	H	_ 15% coverage of surface 67.8-69.2' - grayish yellow to dusky	-
-	84%			67.95' - Bedding plane, 30 deg, rough, undulating, open up to 1/2"	世	yellow, (5Y 8/4, 5Y 6/4), medium	-
	-		3	68.5' - Bedding plane, <5 deg, smooth to	₩	grained, mild HCl reaction, medium strong (R3), porous voids <1/16" with	-
70_ -28.0	-		1	rough, undulating, open up to 1/4" _ 68.6' - Bedding plane, <5 deg, smooth to	ŦП	— 45 to 55% coverage, trace 1/4"	R3: 5 minutes
-	-		NR	rough, undulating	-Ш	cavities, moderately fossiliferous (casts/molds)	-
-	71.0			68.85-69.15' - Fracture zone, fragments to 2", intersecting fractures	+	- 69.2-70.2' - Same as 66.0-67.8'	-
-	-		3	69.35, 69.7, 69.95' - Fracture, vertical, rough,	+	except extremely weak to medium strong (R0 to R3)	-
-	-			undulating 70.1' - Bedding plane, <5 deg, smooth to	口	- No Recovery 70.2-71.0'	-
-	-		5	rough, undulating, open up to 1/4"	Ш	Limestone 70.2-71.8' - Same as 66.0-67.8'	_
-				71.1' - Fracture, 60 deg, rough, stepped to undulating, open up to 1/8"	щ	- except trace organics	_
-	R4-NQ 5 ft	7	>10	71.3, 71.6' - Bedding plane, 25 deg, rough,	ш	71.8-72.15' - dusky yellow, (5Y 8/4), fine to medium grained, moderate to	_
	80%			undulating, open to 1/8", 1/2" at 71.6' 72.1, 72.35, 72.7' - Bedding plane, <5 deg,	$\Box$	<ul> <li>strong HCl reaction, extremely weak</li> </ul>	-
			>10	rough to smooth, planar, along abrupt	$\bot$	to weak (R0 to R2), poorly to	_
75_				lithology change, open up to 1/8" at 72.1', no	耳	moderately competent, trace voids <1/16" on surface	
-33.0			NR	gap at 72.7 72.15-72.4' - Fracture zone, 70-80 deg,	凵	72.15-74.15' - Same as 66.0-67.8'	R4: 10 minutes
	76.0			multiple hairline fractures, branch-like	$\mathbb{H}$	74.15-75.0' - Same as 67.8-69.2' <b>No Recovery 75.0-76.0'</b>	
	]		2	appearance 72.8' - Bedding plane, 60 deg, rough to	Ш	Limestone	
	]		_	smooth, undulating	Ш	76.0-80.0' - dusky yellow and yellowish gray, (5Y 6/4 and 5Y 7/2),	
	]		1	73.1-73.3' - Fracture zone, fragments to 2", intersecting fractures	Н	mild to moderate HCl reaction.	
·				73.5' - Bedding plane, 60 deg, rough to	尸	medium strong (R3), voids <1/16" covering 45-55% of surface, trace	
	R5-NQ	E0.	1	smooth, undulating 73.7-74.2, 74.35, 74.6' - Fracture zone,	Н	cavities to 1/4", moderately	]
	5 ft 80%	53	1	fragments to 2", intersecting fractures, open	Ш	fossiliferous (casts and molds), trace organics	]
	1			up to 1/4" at 74.35' and 74.6'	Ш	_ 0.9311100	
80	1		5		Ш		
				_	1 1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-03	SHEET	5	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724208.2 N, 457932.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS : 2.9	ft bgs	s on 5	/07/07 START : 5/7/2007 END : 5/	8/2007	7 LOGGER : N. Jarzyniecki	
				DISCONTINUITIES	ڻ ن	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEDTH OF CASING
HH	RUI VER	(%) О	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	OLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
EV#	ORE ING	αD	RAC-	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	SHR	œ	뜐핊	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	· ·
-38.0			NR	74.8-74.9' - Bedding plane, 60 deg, rough to smooth, undulating, intersects high angle	Н	No Recovery 80.0-81.0'	R5: 3 minutes
l _	81.0		141	fracture, fragments to 2", predominantly 1/4"	Ш	_	
l _			2	76.4, 76.6' - Bedding plane, 20 deg, open up to 1/2" at 76.4'; up to 1/8" gap at 76.6'		<b>Limestone</b> - 81.0-85.7' - Same as 76.0-80.0'	
				77.1' - Bedding plane, 30 deg, open up to	Н	except yellowish gray to dusky	
-				1/2"		yellow, (5Y 7/2 to 5Y 6/4), trace	1
			1	78.6' - Bedding plane, 20 deg, tight 79.1, 79.3' - Bedding plane, 20 deg, open up		- cavities to 1"	1
-	R6-NQ			to 1/2" at 79.1'	$\vdash$	_	1
-	5 ft 94%	63	>10	79.6, 79.7' - Bedding plane, 20 deg, open up to 1/2"	ш	=	1
-	0.70			79.9' - Fracture, 85 deg, rough, undulating		-	
05 -			>10	81.2' - Bedding plane or mechanical break, - 40 deg, rough, undulating	Н	-	1
-43.0				81.9' - Bedding plane or mechanical break,	Ħ	<del></del>	SC-2 collected at 84.7- 85.7'
-			0	<5 deg, rough to smooth, undulating to planar \$2.81 Fracture 75 deg, rough, undulating			R6: 3 minutes
-	86.0		NR	82.8' - Fracture, 75 deg, rough, undulating 83.8-84.1' - Fracture zone, fragments to 1"	$\mathbb{H}$	No Recovery 85.7-86.0' Limestone	-
-			>10	84.75' - Fracture, 75 deg, rough, undulating,	ш	86.0-88.1' - very light gray, (N8), very	-
-				open up to 1/4" 86.4' - Bedding plane, <5 deg, smooth to	Н	fine to fine grained, mild HCl reaction, medium strong (R3), voids	4
-			>10	rough, planar, open to <1/8" gap, organic	$\Box$	- <1/16" with <2% coverage on	4
-	57.110			stain 86.6, 87.5, 88.5, 88.6' - Mechanical break		surface	-
_	R7-NQ 5 ft	58	1	86.9-87.2' - Fracture zone, fragments to 3	H	88.1-90.9' - dusky yellow, (5Y 6/4, N8), fine grained, mild to moderate	_
_	98%			1/2" 88.4' - Fracture, 80 deg, rough, undulating,	ш	<ul> <li>HCl reaction, medium strong (R3),</li> </ul>	_
l _			1	open 1/8"		mottled very light gray (N8) from	
90				89.1' - Bedding plane, 30 deg, rough, undulating —	Н	88.1-88.6', voids up to 1/16" covering 30-40% of surface, cavities up to 1/4"	
-48.0			1	90.2' - Bedding plane, 40 deg, rough,	Н	covering up to 3% of surface, trace	R7: 6 minutes
l _	91.0		ND	undulating	Ш	organics	
l _			( <u>NR</u> ) 1			No Recovery 90.9-91.0' Limestone	
			'	91.7' - Fracture, 75 deg, associated with	Н	91.0-96.0' - yellowish gray, (5Y 8/1),	
				dissolution features or very extensive breaks	Ш	fine to medium grained, strong HCl reaction, weak to medium strong (R2	
			0	in softer area, open up to 2"	Ш	to R3), laminated bedding 91.0-92.5',	1
	R8-NQ			93.1-93.35' - Fracture zone, intersecting	$\square$	trace voids <1/6" and cavities to 1/4", trace fossil casts	1
-	5 ft 100%	80	>10	fractures, fragments to 2"	H	_ 2250 100011 00010	1
1 -				94.0' - Fractures (2), 65 deg, rough,	Ш	-	1
95			3	undulating, open up to 1/2", organic features on fracture surface	Ш	-	1
-53.0				94.6, 95.7' - Bedding plane, <5 deg, smooth	Ш	_	R8: 10 minutes
-	06.0		1	to rough, undulating, open up to 1/2", organic features on fracture surface; no organics at	Ш	<del>-</del>	
-	96.0			95.7'	${\mathbb H}$	96.0-100.6' - light olive gray to	
-			3	96.2' - Fracture, 80 deg, rough, undulating,	Ħ	<ul> <li>yellowish gray, (5Y 5/2 to 5Y 7/2),</li> </ul>	-
-				open 96.7' - Bedding plane (2), 10 deg and 60 deg,	Н	fine grained, strong HCl reaction, weak to medium strong (R2 to R3),	
-			1	rough to smooth, undulating	${\mathbb H}$	<ul> <li>mottled from 96.6-97.5, trace voids</li> </ul>	-
-	R9-NQ			97.5' - Bedding plane, <5 deg, rough to smooth, undulating	Ш	from <1/16" to 1/8", organic layers from 97.6-97.7' (black), trace fossil	-
-	5 ft	57	1	97.6-97.7' - Fracture (3), 0-10 deg, open to	Ш	- casts	-
-	92%			1/4", 1/4" organic infill 98.5' - Bedding plane (2), 10 deg and 60 deg,	$\square$	_	
-			0	rough to smooth, undulating	H	<u>-</u>	SC-3 collected at 99.1- 99.85'
100				99.3, 97.6, 99.85' - Mechanical break	H		
L					1		



PROJECT NUMBER:	BORING NUMBER:			
338884.FL	E-03	SHEET	6 OF 10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724208.2 N, 457932.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS : 2.9	ft bg	s on 5	/07/07 START : 5/7/2007 END : 5/8	3/200	7 LOGGER : N. Jarzyniecki	
				DISCONTINUITIES	ß	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-58.0			0		口		R9: 7 minutes
-	101.0		NR	-	世	No Recovery 100.6-101.0'	-
	·		8	101.1' - Bedding plane, 10 deg, rough,	」	Limestone - 101.0-104.4' - yellowish gray to	
_			L	undulating, open up to 1/8" 101.3, 101.35, 101.4, 101.5' - Bedding plane,	口	dusky yellow, (5Y 7/2, 5Y 6/4), fine to	
_			4	5-10 deg, rough, undulating, open up to 1/8" 101.6' - Bedding plane, 35 deg, rough,	口	medium grained, strong HCI reaction, very weak (R1), 1/16" voids	_
_	R10-NQ			undulating 101.8' - Fracture, 65 deg, rough, undulating	Ь	with 10% coverage, trace cavities to 1/4", trace planar bedding of variable	_
-	5 ft 68%	19	4	101.9' - Bedding plane, 10 deg, rough,	口	thickness, poorly to moderately fossiliferous, zone of circular	-
-	00%		0	undulating, open up to 1/4" 102.2' - Fracture (2), 60 deg and <5 deg,		discoloration from 103.8-104.2'	-
105				rough, undulating, open up to 1/8" 102.9' - Fracture (2), 60 deg and 80 deg,	┢	<ul><li>(possible leaching)</li><li>No Recovery 104.4-106.0'</li></ul>	-
-63.0			NR	rough, undulating, open up to 1/8"	Ь		R10: 4 minutes
	106.0			103.1' - Bedding plane, 10 deg, rough, undulating, open up to 1/8"	Ь		
-			1	103.25, 103.5' - Bedding plane, 35 deg, rough, undulating	ᇤ	Limestone  106.0-109.9' - yellowish gray, (5Y	_
-				103.7 - Fracture, 80 deg and vertical, rough, undulating, open up to 1/8"	뮵	8/1), fine grained, strong HCl reaction, very weak (R1), trace voids	-
-			1	103.9' - Bedding plane, <5 deg, rough,		- <1/16" on surface, laminated bedding	-
-	R11-NQ			stepped 106.6' - Bedding plane, 30 deg, rough,	Ь	-	-
-	5 ft 78%	43	>10	undulating 107.8' - Bedding plane, 25 deg, rough,		-	-
			>10	undulating 108.2-109.8' - Fracture zone, intersecting	Ь	_	]
110_			- 10	fractures, fragments to 2"	Ь	No Recovery 109.9-111.0	
-68.0 –			NR	-			R11: 3 minutes
-	111.0			-	士	Limestone	-
-			1	111.3' - Bedding plane, 30 deg, rough, undulating, open to 1/2"		<ul> <li>111.0-116.0' - mottled yellowish gray and yellowish gray, (5Y 7/2 and 5Y</li> </ul>	-
-				undulating, open to 1/2	士	8/1), fine to coarse grained, strong	-
-			0	- 112.7, 113.5' - Mechanical break		<ul> <li>HCl reaction, very weak to weak (R1 to R2), voids &lt;1/16" with 10-20%</li> </ul>	1
	R12-NQ 5 ft	88	1	,	$\vdash$	coverage, cavities to 1/4" with 5-10% coverage decreasing with depth, 1"	
_	100%	00	·	113.9, 114' - Bedding plane, <5 deg, rough to	Ь	laminated bedding at 114.0', moderately fossiliferous	_
-			1	smooth, undulating, open up to 1/4"	世	-	-
115 <u></u> -73.0				_	世	_	R12: 2 minutes
-	116.0		0	-	ш	_	-
-	110.0		_	- 116.1, 116.25' - Bedding plane, <5 deg,	Ь	Limestone	-
			4	rough to smooth, undulating to planar, open to <1/8"		<ul> <li>116.0-121.0' - yellowish gray, (5Y 8/1), fine to coarse grained, strong</li> </ul>	]
-			0	116.45' - Bedding plane, 35 deg, rough,	$\vdash$	HCl reaction, weak to medium strong (R2 to R3), laminated bedding at	
_	D40.110		Ľ	undulating 116.7' - Bedding plane, <5 deg, rough,	団	116.0-116.35', voids <1/16" with 40% coverage, trace cavities to	-
-	R13-NQ 5 ft	60	1	undulating to planar, open up to 1/4" 117.1, 118.4, 118.8, 119.7, 120.9' -	士	<ul><li>1/2"-1-1/2" cavity at 117.6',</li></ul>	-
-	100%			Mechanical break 118.2' - Bedding plane, 10-15 deg, rough,	士	moderately fossiliferous (casts and molds)	-
120			3	undulating to planar, open up to <1/4"	$\Box$	_	-
120							



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-03	SHEET	7	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724208.2 N, 457932.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DEPTH BELOW SURFACE AND ELEVATION (ft)	_							
l 6₹€	- 🗢 🕨			DISCONTINUITIES		ပ္ခ 📗	LITHOLOGY	COMMENTS
×	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A A CE	L H.	(%) Q	T.00	DEPTH, TYPE, ORIENTATION, ROUGHNE	ESS,		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ORE	ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGH	D	Y ME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_ഗഥ -78.0	OIR	œ	μΔ			S	CHARACTERISTICS	SC-4 collected at 119.7-
-70.0			1	119.0-119.1' - Bedding plane, <5 deg, ro to smooth, undulating to planar, open to	<1/8" -	⇉		120.55'
_	121.0			119.05' - Fracture, 85 deg, fracture between		╙		R13: 2 minutes
_			3	two bedding fractures, open up to 1/8" 120.55' - Bedding plane, <5 deg, rough to	to -	耳	<b>Limestone</b> 121.0-125.95' - Same as	
_				smooth, undulating to planar, open to <1	1/8"	┰	116.0-121.0' except transitions from	
_			2	121.3' - Fracture, 85 deg, rough, undulat open to <1/8"	ting,	T	coarse to fine grained with depth, percentage of voids and fossils	
_				121.85, 121.9, 122.0' - Bedding plane, <		$\blacksquare$	decrease with depth, laminated	
_	R14-NQ 5 ft	40	1	deg, smooth to rough, undulating, open to 1/4"	up to		bedding from 122.6-125.1'	
	99%	40	'	122.2' - Bedding plane, <5 deg, smooth t	to	Н		
			- 10	rough, undulating, open to <1/8" 122.4' - Fractures or mechanical break (	<sub>2)</sub>	Ц		
125			>10	75 deg and <5 deg, rough, undulating, hi		Ц		
-83.0			. 10	angle fracture intersected by bedding (pa fracture), open up to 1/8"	artial —	一	_	R14: 2 minutes
_	126.0		>10	123.9, 124.5' - Bedding plane, <5 deg,	1	7		
-	-20.0		(NR)	smooth to rough, undulating, open up to	1/4"	士	No Recovery 125.95-126.0'	
-			0	124.6' - Fracture, 50 deg, rough, undulat open to <1/4"	<sup>y,</sup> +	廾	Limestone 126.0-130.85' - yellowish gray, (5Y	
-				124.65' - Bedding plane, <5 deg, smooth	n to	다	8/1), fine to medium grained, strong	
-			1	rough, undulating, open up to 1/4" 124.9-125.8' - Fracture zone, intersecting	a 🕇	ㅁ	HCl reaction, very weak to weak (R1 to R2), voids <1/16" with 10%	
-	R15-NQ			fractures, fragments to 1-1/2"	ĭ ±	$\vdash$	coverage, trace voids to 1/4" and	
_	5 ft 97%	63	2	127.3' - Bedding plane, 30 deg, rough, undulating, open up to 1/2"	4	$\vdash$	voids <1/16" with 30% coverage from 127.2-128.6' and 130.0-130.85', zone	
_	9170			128.4, 128.65' - Mechanical break	. 🛨	⇉	of slightly undular laminated bedding	
400			4	128.85, 128.9, 129.1, 129.3' - Bedding pl <5 deg, rough to smooth, undulating, ope	en up	╁	from 128.7-129.2'	
130 <u> </u>				to 1/4"; may have associated dissolution		4	_	R15: 3 minutes –
			1	cavities at 128.9', 129.1', and 129.3' 129.5, 129.55' - Bedding plane, <5 deg,	-	다		
_ ا	131.0		NR	smooth, planar to undulating, open to <1			No Recovery 130.85-131.0'	
_			>10	130.25' - Bedding plane, 20 deg, rough to smooth, undulating, open to <1/8"	io <u> </u>	+	<b>Limestone</b> 131.0-132.8' - yellowish gray, (5Y	
_				131.1' - Bedding plane, <5 deg, rough to	, ‡	₽	8/1), fine to medium grained, strong	
_!			>10	smooth, organic stain, open up to 1/4" 131.2-131.4' - Fracture zone, intersecting	<u>,</u>	╧	HCl reaction, very weak (R1), undular bedding planes (variable	
_	D40 NO			fractures, fragments to 1-1/2"	9 -	╙	thickness 1/2" to 1-1/2"), trace voids	
_	R16-NQ 5 ft	0	3	131.7' - Fracture, 70 deg, rough, undulat open, piece of fracture missing, organic		Ц	to 1/16"	
_	78%			staining	上	┰┞	132.8-134.9' - yellowish gray and light olive gray, (5Y 8/1 and 5Y 5/2),	
_			>10	132.0-132.7' - Fracture zone or bedding plane, <5 deg, rough, undulating, open u		┰┞	fine to medium grained, very weak to	
135				1/8"	· —	$\dashv$	weak (R1 to R2), up to 1/16" voids – cover 5-10%, wavy laminated	
-93.0 _			NR	132.7-132.85' - Fracture zone, fragments 1/2"	s to	$\rightrightarrows$	bedding transitioning to planar with depth, trace fossils (casts)	R16: 2 minutes
_	136.0			172 133.4, 133.9, 133.95, 134.0, 134.2, 134.0	6,	╧	No Recovery 134.9-136.0'	
_			>10	134.65' - Fracture zone or bedding plane	e, <5	4	Limestone	
_				deg, rough, undulating, open up to 1/8" 134.5-134.6' - Fracture zone, fragments	to _	口	136.0-139.6' - yellowish gray, (5Y 7/2, 5Y 8/1), very fine to fine grained,	
_			3	1/2"	-	┰	strong HCl reaction, trace fossil	
			J	136.0-136.4' - Fracture zone, intersecting fractures, fragments to 1-1/2"	y F	$\dashv$	casts/molds, elongated voids to 1/2" with 5-10% coverage from	
<sup></sup>	R17-NQ	13	>10	136.5, 136.8, 136.9, 137.1' - Bedding pla	ane,	$\rightrightarrows$	136.0-137.5', voids <1/16" with 10%	
٦	5 ft 72%		-10	<5 deg, rough, undulating, open up to 1/2 associated with dissolution	<sup>2"</sup> , 1	╁	coverage	
			2	137.4' - Fracture, 65 deg, rough, undulat	ting,	4		
140				open up to 1"; fossils and voids	1	耳	No Recovery 139.6-141.0'	
						T	-	
					1			I .



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-03	SHEET	8	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724208.2 N, 457932.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER LEVELS : 2.9 ft bgs on 5/07/07										
>00	6)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
-98.0			NR	137.8' - Bedding plane, <5 deg, rough,	ш		R17: 5 minutes			
_	141.0		- 10	undulating, open up to 3/4" 138.1-138.5' - Fracture zone, fragments to 1-1/2"		Limestone	-			
_			>10	138.8, 139.1' - Bedding plane, <5 deg, rough, undulating, open up to 1/2", associated with dissolution	H	141.0-143.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1), voids	-			
_	R18-NQ		>10	139.5' - Fracture, 60 deg, rough to smooth, undulating, open to <1/8" 141.2-141.7' - Fracture zone or bedding	Ħ	<1/16" with 30% coverage, wavy bedding planes to 1/2"	-			
_	5 ft 74%	15	2	plane, <10 deg, rough, undulating, open to <1/2" (most <1/8") 141.75-142.2' - Fracture zone, intersecting	$\exists$	143.5-144.7' - yellowish gray, (5Y - 8/1), very fine grained, moderate HCl reaction, medium strong to strong	-			
145 <u> </u>			NR	fractures, fragments to 1/2" 142.25, 142.3' - Bedding plane, <5 deg, rough, planar	H	(R3 to R4), voids <1/16" with 10-20% — coverage, 1/4" zone at 143.75' of weak to medium strong rock (R2 to	R18: 3 minutes			
_	146.0			142.4-143.0' - Fracture zone, fragments to 1-1/2" 143.1, 143.3' - Bedding plane, open to 1/4"		R3) with voids <1/16" covering 30-40% of the surface and slightly darker color	-			
-			1	143.5' - Mechanical break 144.1' - Fracture, 75-80 deg, rough, undulating, organic stain or mineralization,	H	No Recovery 144.7-146.0' Limestone 146.0-147.0' - gravish yellow to	-			
_	R19-NQ 5 ft 98%		1	open 144.3' - Mechanical break 146.85' - Fracture, 70 deg, rough, undulating 147.75' - Bedding plane, <5 deg, rough,		yellowish gray, (5Ý 8/4 to 5Y 7/2), very fine to fine grained, strong HCl reaction, strong to weak (R4 to R2),	-			
_		58	3	undulating 148.6, 148.65, 150.8, 150.9' - Bedding plane, <5 deg, rough, undulating, 1/4" open	trace organics and voids <1/16" 147.0-147.9' - yellowish gray, light olive gray, and grayish yellow, (5Y	trace organics and voids <1/16" 147.0-147.9' - yellowish gray, light	-			
150 <u> </u>			0	148.1, 148.5, 149.95' - Mechanical break	Ė	7/2, 5Y 5/2 and 5Y 8/4), fine grained,  — strong HCl reaction, very weak to  weak (R1 to R2), voids <1/16" with	SC-5 collected at 148.95-			
	151.0		2		Н	10% coverage, trace organics, wavy laminated bedding, possible cross	150.80' – R19: 4 minutes			
_			\ <u>NR</u> >10	151.0-151.35' - Fracture zone, intersecting fractures, fragments to 1-1/4", some organic staining	Ħ	bedding 147.9-150.9' - grayish yellow, (5Y 8/1), fine to medium grained, strong				
-			2	151.6' - Bedding plane, 15-40 deg, open up to 1" 152.15, 152.45' - Bedding plane, <5 deg,	H	HCl reaction, weak to medium strong (R2 to R3), voids <1/16" with 10% coverage, trace cavities to 1/4"	_			
-	R20-NQ 5 ft 97%	37	3	rough, undulating, open to <1/8" 153.15' - Fracture, 40-45 deg, rough, undulating, open <1/8" to 1/2"	Ħ	No Recovery 150.9-151.0' - Limestone _ 151.0-152.15' - yellowish gray, (5Y	-			
155_			3	153.3, 153.9, 154.9' - Bedding plane, <5 deg, rough, planar, open to 1/4" at 154.9' 154.6' - Fracture (2), 65 deg and <5 deg,		7/2), fine grained, strong HCI  reaction, weak to medium strong (R2  to R3), trace voids <1/16", poorly				
-113.0 -			1	intersected with bedding fracture, open up to 1/8"	H	fossiliferous - 152.15-155.85' - Same as	R20: 2 minutes			
-	156.0		NR.	155.8' - Bedding plane, <5 deg, rough,	H	151.0-152.15' except yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4),	-			
-			2	undulating, open to <1/8" 156.15' - Bedding plane, <5 deg, smooth to	H	- weak (R2) No Recovery 155.85-156.0	-			
-			>10	rough, planar to undulating, trace organics, open to <1/4"  156.7' - Bedding plane, 10 deg, rough,		Limestone  - 156.0-160.4' - yellowish gray to mottled yellowish gray, and dusky	]			
_	R21-NQ 5 ft 88%	23	>10	undulating, open up to 1" 157.1' - Bedding plane, <5-35 deg, rough, undulating, open up to 1" 157.2' - Bedding plane, 35 deg, rough,		yellow, (5Y 7/2 to mottled 5Y 6/4 and 5Y 6/2), fine to medium grained, strong HCl reaction, medium strong	-			
- 160			4	undulating, open up to 1/8"		(R3), trace voids, trace fossils (casts)	-			
					1					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-03	SHEET	9	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724208.2 N, 457932.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS : 2.9	ft bas	s on 5	/07/07 START : 5/7/2007 END : 5/	8/2007	7 LOGGER : N. Jarzyniecki	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE ATIO	RUI TH,	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	JOLK	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FRH	ORE	Ø	RAC ER F	PLANARITÝ, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-118.0	OIR	22			S	O IAI AO TENIO 1100	Driller's Remark: 100%
-116.0			>10	157.35' - Bedding plane, <5 deg, rough, undulating, open up to 1/8"	H	No Recovery 160.4-161.0'	loss of circulation at 159.5'
-	161.0		NR	157.45-157.7' - Fracture zone, intersecting	Н		R21: 3 minutes
_			4	fractures, fragments to 1" 157.8, 157.9, 158.5' - Bedding plane, <5 deg,	Ш	<b>Limestone</b> - 161.0-162.6' - yellowish gray, (5Y	_
_				rough, undulating, open up to 1/8"	П	7/2), fine grained, moderate to strong	_
_			3	158.6-158.8' - Fracture zone, intersecting fractures, fragments to 1-1/2"	Ш	HCI reaction, medium strong (R3),  <1/16" voids with 5-10% coverage,	_
_				158.9, 159.05, 159.15, 159.3' - Bedding	Н	trace cavities to 1/4", poorly	_
_	R22-NQ 5 ft	28	8	plane, <5 deg, rough, undulating, open 1/8-1/4"	Н	fossiliferous - 162.6-165.25' - alternating dusky	_
_	85%			159.6' - Bedding plane, 10-30 deg, rough,	H	yellow to light olive gray, (5Y 6/4 to	<u> </u>
_			5	undulating, open up to 1/8" 160.05' - Bedding plane, 35 deg, rough,	Н	5Y 5/2), medium to very fine grained, strong to moderate HCl reaction,	<u> </u>
165				undulating, open up to 1/8"	Ш	15-20% coverage of voids <1/16"	
-123.0			>10	160.1-160.2' - Fracture zone 161.05, 161.5, 161.6' - Bedding plane, <5	口	and fossiliferous in dusky yellow zones; trace voids <1/16" and no	R22: 3 minutes
l _	166.0		NR	deg, rough, undulating, open up to 1/4" 161.75' - Bedding plane, <5 deg, rough,		visible fossils in light olive gray zones	_
l _			1	undulating, open up to 1"	Н	No Recovery 165.25-166.0' Limestone	<u> </u>
_				162.6' - Bedding plane, <5 deg, rough, undulating, open to <1/8"	H	166.0-170.6' - light olive gray and dusky yellow, (5Y 5/2 and 5Y 6/4),	SC-6 collected at 166.0-
_			2	162.8, 162.9' - Bedding plane, <5 deg, rough,	Ш	fine to medium grained, moderate	166.85'
_			_	planar, open up to 1/4" 163.1' - Fracture, 60 deg, rough, undulating,	Н	HCl reaction, medium strong to	]
_	R23-NQ 5 ft	29	>10	open to 1/8"	Ш	strong (R3 to R4), voids to 1/16" with 30-40% coverage and cavities up to	]
l _	92%	23	- 10	163.3, 163.4' - Bedding plane, <5 deg, rough,	ш	1/4"x1/2", color transitions to	
l _			4	undulating, open up to 1/4" 163.45' - Fracture, 85 deg, rough to smooth,	Н	moderate yellowish brown (10YR 5/4) at 169.7' with interbeds of light	
170_			+	planar to undulating, intersects bedding plane	Н	olive gray material up to 2"	
-128.0			1	fracture — 163.55, 163.6, 163.65' - Bedding plane, <5	H	_	R23: 3 minutes
_	171.0		NR	deg, rough, undulating, open up to 1/4" 163.9' - Bedding plane, horizontal and 35		No Recovery 170.6-171.0'	
_			4	deg, open		<b>Limestone</b> - 171.0-174.3' - Same as 166.0-170.6'	
_			7	164.3, 164.4, 164.6, 164.75, 164.8' - Bedding plane, <5 deg, rough, undulating, open up to	Н	except light olive gray to dusky	
			>10	1/4"	Щ	yellow, (5Y 5/2 to 5Y 6/4)	
			- 10	165.0-165.2' - Fracture zone, fragments to 1", most to 1/4", intersecting fractures	Щ	_	
	R24-NQ	33	>10	166.85, 167.4, 167.5' - Bedding plane, <15	Н		1
	5 ft 66%	JJ		deg, rough, undulating, open to 1/8" 168.0' - Fracture, 75 deg, rough, undulating,	F		1
			_1_	open up to 1/8"	片	- No Recovery 174.3-176.0'	1
175				168.25, 168.35, 168.5' - Bedding plane, <15 deg, rough, undulating, open up to 1/8" —	Щ		1
-133.0			NR	168.7, 168.85' - Bedding plane, <5 deg,	Н	_	R24: 4 minutes
_	176.0			rough, undulating, open to 1/8" 169.1, 169.7, 169.75' - Bedding plane, <5	Ш		1
			2	deg, smooth to rough, planar, open to 1/8"	Ш	Limestone	1
_			3	169.85, 170.35' - Fracture, 55-60 deg, rough, undulating, open to 1/2"	Н	<ul> <li>176.0-177.3' - yellowish gray, (5Y 8/1), very fine to medium grained,</li> </ul>	]
-			_	171.2, 171.45, 171.55, 171.95' - Bedding	Ħ	moderate to strong HCl reaction,	1
_			3	plane, <5 deg, rough to smooth, planar, open up to 1/4", open to 1/2" at 171.95	Ħ	<ul> <li>medium strong to strong (R3 to R4), moderately fossiliferous (casts, trace</li> </ul>	1
	R25-NQ			172.8-178.4 - Fracture zone, intersecting	Ш	molds), voids <1/16" with 10%	1
-	5 ft 95%	18	3	fractures, fragments to 1-1/2" 173.5, 174.05' - Bedding plane, <5 deg,	$\mathbb{H}$	<ul> <li>coverage, cavities to 1/4" with 5% coverage</li> </ul>	1
-				rough to smooth, planar, open up to 1/4",	Ш	3 -	1
180			6	gray staining at 173.5'	Ш	-	1
					П		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-03	SHEET	10	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724208.2 N, 457932.6 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

WATER	LEVELS : 2.9	ft bgs	s on 5	/07/07 START : 5/7/2007 END : 5/	3/200	D7 LOGGER : N. Jarzyniecki	
≥ ∩ ⊕	6)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	<u>.</u>	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
THE FAC	RE RI JGTH 30VE	(%) □ (	4CTU	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	MBOL	WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	SEE	a a	FR/ PEF	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-138.0 -			5	176.35, 176.5, 176.8, 177.3' - Bedding plane, <10 deg, rough, undulating, open to <1/8",	E	177.3-178.3' - yellowish gray to dusky yellow, (5Y 8/4 to 5Y 6/4), fine	R25: 4 minutes
_	181.0		NR	organic stains or thin laminae at 177.3' 177.5' - Bedding plane, <5 deg, rough, planar	to medium grained, moderate HCl reaction, medium strong to weak (R3	_	
-	4			to undulating, open to <1/8"	世	to R2), voids to 1/8" with 10-20% `	-
-				177.7' - Bedding plane, 35 deg, rough, undulating, open to <1/2"	H	coverage increasing with depth 178.3-180.75' - Same as	-
-			>10	178.15, 178.5' - Mechanical break 178.65, 178.75, 178.9,179.0, 179.15, 179.3,	片	<ul> <li>176.0-177.3' except poorly fossiliferous and trace voids &lt;1/16",</li> </ul>	
	R26-NQ 5 ft	20	>10	179.5' - Bedding plane, <5 deg, rough, planar to undulating, open to <1/8"	H	laminated bedding No Recovery 180.75-181.0'	
-	85%			179.75' - Bedding plane, <5 deg, rough, planar to undulating, open to 1/8"	Ħ	<b>Limestone</b> 181.0-182.5' - Same as 177.3-178.3'	-
185			4	179.8, 180.2, 180.3 - Bedding plane, <5 deg, rough, planar to undulating, open to <1/8"	Ħ	<ul> <li>except mild to moderate HCl reaction 182.5-185.25' - alternating yellowish</li> </ul>	-
-143.0			1	180.1' - Fracture, 60 deg, rough, undulating	Ħ	gray, (alternating 5Y 8/1 and 5Y 7/2), very fine to medium grained, strong	R26: 3 minutes
	186.0		NR	180.4' - Fracture, 85-90 deg, rough, undulating	H	to moderate HCl reaction, strong to	_
-				180.65' - Bedding plane, <5 deg, rough, stepped, open up to 1/4"		medium strong (R4 to R3), alternating beds, trace voids <1/16"	_
_				181.2, 181.5, 181.7, 181.9' - Bedding plane,   <10 deg, stain on some fracture planes, open	1	and cavities to 1", voids <1/16" with 20-30% coverage, cavities to 1/4"	_
-				up to 1/8"	1	with 10% coverage, 1/16" laminated bedding only visible in finer grained	-
-				open to <1/8" 182.5' - Bedding plane, <10 deg, open to 1/8"	1	beds No Recovery 185.25-186.0'	-
-				182.85-183.0' - Fracture zone, fragments to 1", intersecting fractures		Bottom of Boring at 186.0 ft bgs on	
_				183.1' - Bedding plane, 15 deg, organic stain,		5/8/2007 -	_
-				open to <1/8" 183.4-183.5' - Fracture zone, fragments to 1",	$\mathbf{I}$	_	_
-				intersecting fractures 183.6, 183.9, 184.2, 184.8, 184.4, 185.0,	ł	<u> </u>	-
-				185.2' - Bedding plane, <10 deg, open to 1/8" 183.65, 184.25' - Fracture, 55-60 deg, rough,	1	<u> </u>	-
				undulating, open to <1/8"			
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	F-04	SHEET	1	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 5.5 ft bo	gs on 5/03	3/07 5	START : 5/2/2007 END : 5/3/2007 LOGGER : M. Faurote, N. Jarzyniecki
~ ~ ~				STANDARD	SOIL DESCRIPTION O COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
DEP SURI ELE\			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
43.1	0.0			4.0.0	Topsoil 0.0-0.3'  No water level - start hole
_		1.4	SS-1	1-2-2 (4)	Poorly Graded Sand With Organics (SP)  Cathead operator: Paul Buchler
-	1.5				0.3-1.4' - medium light gray grading to medium gray ∖ and greenish black, (N6 to N5 and 5GY 2/1), moist, / ¬
-					\very loose, fine grained, 20-25% organic fines, \decreasing with depth, sand is silica
-	-				
-	1				<b> </b>
-					]
-					]
5 38.1	5.0				Clayey Sand (SC)
-		1.0	SS-2	1-2-2	↑ 5.0-5.35' - light greenish gray, (5GY 8/1), wet, very
-	6.5	1.0	33-2	(4)	│ loose, very fine to fine grained, 35% low to medium │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │
-	0.5				Silty Sand (SM)   5.35-6.0' - grayish orange, (10YR 7/4), wet, very
	]				loose, very fine to fine grained, 25% nonplastic fines, sand is silica
_					Sanu is sinca
-					<b>-</b>
-					
10	10.0				<b> </b>
33.1	10.0			00.40.50/5	Silt With Sand (ML)
		1.2	SS-3	22-40-50/5 (90/11")	10.0-11.2' - dark yellowish orange, (10YR 6/6), moist, hard, nonplastic, rapid dilatancy, mild HCl reaction,
_	11.4				16% of sand-sized, carbonate material
-	-				
-					
-	1				
					]
-	-				] ] .
15 28.1	15.0			40-50/4	Silt With Sand (ML)
	15.8	0.7	SS-4	(90/10")	15.0-15.7' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl
-	-				\reaction, 15% fine to medium sand-sized, carbonate
-	]				\(\text{material}\)
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-04	SHEET	2	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER LEVELS : 5.5 ft bgs on 5/03/07 START : 5/2/2007 END : 5/3/2007 LOGGER : M. Faurote, N. Jarzyniecki									
				STANDARD	SOIL DESCRIPTION COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION				
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND				
DEPT SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY				
23.1	20.0	0.1	SS-5	50/2	Limestone Fragments				
-	•			(50/2")	20.0-20.1' - grayish orange, (10YR 7/4), mild HCl reaction, coarse sand-sized fragments, very poor				
					recovery				
					] [				
_									
_	_								
-	-								
-	_								
-	05.0								
25 18.1	25.0				Silty Sand (SM)				
-	1	1.0	SS-6	13-20-25	25.0-26.0' - grayish orange, (10YR 7/4), wet, dense, fine to coarse grained, mild HCl reaction, 30%				
-	26.5			(45)	nonplastic fines, 13% gravel-sized limestone fragments with many fossil molds/casts, all carbonate				
					material				
_									
-	_								
-									
-					-				
30 <u> </u>	30.0				Sandy Silt (ML)				
-		1.1	SS-7	5-17-14	30.0-31.1' - dusky yellow, (5Y 6/4), wet, hard, fine to coarse grained, fine% gravel, nonplastic, rapid				
-	31.5			(31)	□ dilatancy, mild HCl reaction, 30% fine to coarse				
					\sand-sized, 10% fine gravel-sized limestone   -				
_									
_					<b>.</b> .				
-	-								
-									
-	05.0								
35 8.1	35.0 35.3	0.3	SS-8	50/4	Limestone Fragments				
-	-			(50/4")	\ 35.0-35.3' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, coarse sand to fine				
_					gravel sized fragments, poor recovery				
					] [				
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- 40	-				-				
40					<del>                                     </del>				
1									



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-04	SHEET	3	OF	12

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	TER LEVELS : 5.5 ft bgs on 5/03/07									
				STANDARD	SOIL DESCRIPTION		G	COMMENTS		
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COULNAME LIGOS OFOUR OVARDOL COLOR	1	SLO	DEDTIL OF GACING DRILLING DATE		
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	1	30Li	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND		
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	1	SYMBOLIC LOG	INSTRUMENTATION		
3.1	40.6	0.1	SS-9	50/4	☐ Limestone Fragments	7	_	Very hard rock, a lot of bit chatter - if		
_				(50/4")	\\dagger 40.0-41.0' - pale olive, (10Y 6/2), mild HCl reaction, \\poor recovery	/1		continues will start coring at 45.0' -		
					,	]				
						]				
_						4		_		
_						4		_		
-						4		-		
-						┪		-		
45 -	45.0					+		-		
45 <u> </u> -1.9	45.0	0.0	00.40	30-50/4	Silty Sand With Limestone (SM)	+	П	Continue drilling soils based on drillers log of		
-	45.8	0.6	SS-10	(80/10")	45.0-45.6' - light olive, (10Y 5/4), wet, very dense, fine to coarse grained, mild HCl reaction, 40% low plastic	/†	1441	nearby boring GSC-6 where they went - through a tough rock layer, then about 5.0' of		
-					\fines, 15% fine gravel-sized, carbonate material	1		sand from about 48.0-53.0', the driller wants to make sure they case deep enough at the		
						]		start of the hole		
_						4		_		
_						4		_		
_						4		-		
-						┨		-		
	50.0					┨		-		
50 -6.9	50.0 50.4	0.3	SS-11	50/5	_ Silty Gravel With Sand (GM)	Ⅎ.	ΠŢ	$\vdash$		
-				(50/5")	50.0-50.3' - moderate olive brown, (5Y 4/4), wet, very dense, fine to coarse grained, mild HCl reaction, 22%	H		-		
-					low plastic fines, 38% fine to coarse sand, carbonate			1		
					material	]		]		
						]				
_						4		_		
-						4		-		
-						4		-		
						┨		-		
55 <u> </u>	55.0				Silty Sand With Limestone (SM)	+	П	-		
-		1.4	SS-12	22-35-35	55.0-56.4' - moderate olive brown, (5Y 4/4), wet, very dense, fine to coarse grained, mild HCl reaction,	1		-		
-	56.5			(70)	20-25% low plastic fines, 20% fine to coarse	1		-		
-					gravel-sized, carbonate materials	/ [		1		
						]		]		
						1				
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-						4		-		
						+		-		
60_						+				
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-04	SHEET	4	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 5.5 ft bo	gs on 5/03	3/07	START : 5/2/2007 END : 5/3/2007 LOGGER : M. Faurote, N. Jarzyniecki
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
HE HE		RECOVE	ERY (ft)	120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
				(N)	I I
-16.9	60.0			33-42-50/5	Silty Sand With Gravel (SM) 60.0-61.3' - moderate olive brown, (5Y 4/4), moist,
l _	]	1.3	SS-13	(92/11")	very dense, fine to coarse grained, rapid dilatancy.
l _	61.4				mild to moderate HCl reaction, 40% nonplastic fines, 17% gravel-sized limestone fragments
l _	]				Begin Rock Coring at 61.5 ft bgs See the next sheet for the rock core log
l _					See the next sheet for the rock core log
	]				]
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65	1				1
-21.9	1				<b>-</b>
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-	1				1
-					1
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-	1				<b>1</b>
-	1				<b>1</b>
-	1				<b>1</b>
70	1				<b>1</b>
-26.9	1				
-	1				<b>†</b>
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PROJECT NUMBER:

33884.FL BORING NUMBER:

E-04 SHEET 5 OF 12

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 5.5	ft bgs	s on 5/	03/07 START : 5/2/2007 END : 5/	3/200	LOGGER : M. Faurote, N. Jarzyn	iecki
30₽	(%)			DISCONTINUITIES	ا ي	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ATIC	L H.	(%) Q	7.00 1.00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	OLIG OLIG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FRA	D'S CO	OΩ	SAC ER F	PLANARITY, INFILLING MATERIAL AND	/MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
교호교		ď	F F	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	·
_	61.5		3	61.6' - Fracture, rough, undulating	$oldsymbol{\perp}$	Limestone - 61.5-65.5' - moderate yellowish	16:05 Began inserting new bit and reamer to 61.5'
_				61.95' - Mechanical break 62.3' - Mechanical break		brown, (10YR 5/4), fine to medium	Driller's Remark: Reamed
			0	62.5' - Fracture, rough, undulating, along		grained, mild HCl reaction, weak	the borehole to 61.5' below
	D4 NO		2	solution cavity	$\vdash$	<ul> <li>(R2), 30% void space typically related to fossil casts, trace stringers</li> </ul>	ground surface - 5/2/07 at 16:23,
-	R1-NQ 4.5 ft	63		62.85' - Bedding plane, possible separation		and lenses of black organic material	Commence coring
-	89%		1	63.9' - Mechanical break	╁	<ul> <li>from 61.5', moderate HCl reaction where pulverized, solution cavities to</li> </ul>	First core run is 4.5' long to - get even run at 66.0'
					口	1-1/2"x3/8", organic lenses, partings	ger even fun at co.o
65 <u> </u>			3	64.85' - Mechanical break —	$\pm$	— and blebs disseminated through the	R1: 2 minutes
-			ND	65.1' - Mechanical break or fracture, along solution cavity	+	run No Recovery 65.5-66.0'	-
-	66.0		NR	65.25' - Mechanical break or fracture, along	Ħ	Limestone	-
-			1	solution cavity	₽	- 66.0-67.8' - Same as 61.5-65.5'	-
_				66.5' - Mechanical break		_	_
_			1	67.25' - Mechanical break		_	
l _					$\bot$	- 67.8-68.0' - yellowish gray, (5Y 7/2),	
	R2-NQ			67.95' - Fracture, smooth, planar, at contact with finer grained segment	Ħ	very fine grained, moderate HCl	
-	5 ft 98%	90	0	with finer grained segment		reaction, weak to medium strong (R2	1
_						<ul> <li>to R3), limestone is composed of silt sized particles with trace organic</li> </ul>	1
70			1	69.55' - Fracture, 65 deg, rough, irregular		pieces	1
-26.9				70.0' - Mechanical break	1	— 68.0-69.6' - light olive gray, (5Y 5/2), fine to medium grained, mild to	R2: 4 minutes
-			1	70.6' - Mechanical break or fracture, very	Ħ	moderate HCl reaction, weak to	1
-	71.0		NR)	rough, irregular	+	<ul> <li>medium strong (R2 to R3), 40% open voids that are fossil casts of forams</li> </ul>	-
-			2	71.5' - Fracture, smooth, undulating, some	₽	and some possible pelecypods, thin	-
-				fines buildup from drilling	$-\Box$	_ stringers of carbon or organic black	-
-			1	71.95' - Mechanical break	+	material between 68.0' and 68.3' 69.6-70.45' - Same as 67.8-68.0'	-
_				70.01 5 1 11 11 11 11 11 11		except laminar bedding	-
-	R3-NQ 5 ft	78	1	73.0' - Fracture, smooth, undulating, soft thin gouge zone and gently undulant surface near		70.45-70.9' - Same as 68.0-69.6' No Recovery 70.9-71.0'	_
_	98%	. •	·	contact	$\bot$	_ Limestone	
			2	73.5' - Fracture, appears shattered, angular faces	」	71.0-72.9' - moderate olive brown,	]
75				74.3' - Mechanical break	$\vdash$	(5Y 4/4), fine grained, mild HCl reaction, very weak to weak (R1 to	1
-31.9				74.95' - Fracture, appears shattered at	H	R2), except 72.3-72.9' zone medium	R3: 4 minutes
	76.0		4	lithology change, angular 75.3' - Fracture, 30 deg, smooth, planar		strong to strong (R3 to R4), voids to 1/16" covering 20% of surface,	1
-	. 5.0		NR)	75.6' - Fracture, 3-5 deg, smooth	╨	fossiliferous (casts)	1
_			1	75.75' - Mechanical break 75.85' - Mechanical break	口	72.9-73.5' - light brown, (5Y 6/4), fine	
-				76.65' - Mechanical break, 60 deg, probably	╁┌	to medium grained, mild HCl reaction, very weak (R1), bedding	-
-			4	part of cleavage 77.6-78.0' - Fracture zone, cannot describe	H	<ul> <li>planes irregular, with varying angles</li> </ul>	-
_	R4-NQ			because the fragments were cleaved by the	Ë	and gently crenelated, the angle increases with depth, small stress	-
-	5 ft	50	>10	bit; fragments are angular with sharp edges,	$\vdash$	<ul> <li>fractures between and through the</li> </ul>	-
-	73%			may have been broken during drilling	$\blacksquare$	planes, which are laminar to thin bedded	_
-			>10	79.0' - Fracture, 40 deg, 1" thick where there is a parallel fracture, these have been broken		– 73.5-75.0' - moderate yellowish	
80_				then another fractured piece to 79.4, the	F	brown, (10YR 5/4), fine to medium	
-36.9			NR	remainder of the rock is unbroken	片	grained, mild to very mild HCl reaction, medium strong (R3),	R4: 7 minutes Driller's Remark: Lost -
	81.0				$\vdash$	12-15% voids (fossil casts), trace	circulation at 80.0-80.3'
1 -					Ш	laminar bedding, trace organics	1

ORIENTATION : Vertical



PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-04

SHEET 6 OF 12

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 5.5	ft bg	s on 5	/03/07 START: 5/2/2007 END: 5/3	3/200	7 LOGGER : M. Faurote, N. Jarzyn	iecki
\$ □ \$	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - 85 -41.9	R5-NQ 5 ft 84%	27	>10 7 5 >5	81-81.7' - Fracture zone, rock fragments from 1/4'-1/2", no visible orientation, angular to subangular fragments 81.9' - Fracture, undulating, generally horizontal, irregular 82.2' - Bedding plane, <5 deg, open 82.6-83.0' - Fractures, 0-90 deg, open, fragments vary in shape and size 83.0-83.5' - Fractures, 0-90 deg, open, fragments vary in shape and size 85.7' - Fracture, fracture from 85.7-85.9' does not extend across the core		75.0-75.75' - Same as 72.9-73.5' except trace organics 75.75-77.6' - light brown, (5Y 6/4), fine grained, weak to medium strong (R2 to R3), 15-30% void space (fossil casts), mild HCl reaction unless pulverized 77.6-79.65' - light olive gray with pale olive alteration bands, (5Y 5/2 with 10Y 6/2), very fine to medium grained, moderate to strong HCl reaction, strong (R4) No Recovery 79.65-81.0'	
- - -	86.0		0	86.5-86.9' - Fracture zone, fragments <1" x 1" average at 1/2" x 1/2"		<ul> <li>Limestone         81.0-82.2' - light bluish gray grading         to light olive gray, (5B 7/1 to 5Y 6/1),         very fine to fine grained, mild HCI         reaction, strong to very strong (R4 to     </li> </ul>	End of drilling for the day, 5/2/07 at 86' - Resume drilling on 5/3/07 Water level 5.5' below ground surface on 5/3/07 -
- - -	R6-NQ 5 ft 86%	63	0	87.75' - Fracture or bedding plane, 0-20 deg, rough, undulating, 1" open, 88.3' - Mechanical break 88.5' - Mechanical break		R5), delayed reaction to HCI, voids <1/16" over 20% of surface, trace cavities to 1/8", trace organics, poorly fossiliferous 82.2-83.1' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to	
90_ -46.9 -	91.0		>10 >10 NR	89.35' - Fracture, 80 deg, rough, undulating, 1/8" open 89.7-90.15' - Fracture zone, intersecting fractures, up to 1" x 1/2" fragments, some silt with organics from 89.7-89.8'		medium grained, mild to moderate  HCl reaction, medium strong to strong (R3 to R4), voids to 1/16" 5% coverage, trace organics 83.1-85.2' - dusky yellow transitioning	R6: 6 minutes  Possible start of breccia zone at 89.7-90.5'
    -51.9	R7-NQ 5 ft 96%	67	0 >10 3 2	91.85' - Mechanical break  92.6-93.05' - Fracture zone, with some clay infill  93.4, 93.75' - Fracture or bedding plane (2), horizontal, rough, undulating, 5% organics on bottom surface of fracture, up to 1/4" open 93.6' - Fracture, 80 deg, rough, undulating, organics on 5% of fracture  94.2' - Mechanical break		to yellowish gray, (5Y 6/4 to 5Y 8/1), fine grained, mild HCI reaction, medium strong to strong (R3 to R4), voids <1/16" 30-40% coverage  No Recovery 85.2-86.0' Limestone 86.0-90.3' - Same as 83.1-85.2' except moderately fossiliferous, with 5-10% coverage of cavities to 1/2" No Recovery 90.3-91.0' Limestone 91.0-93.5' - yellowish gray and light olive gray, (5Y 7/2 and 5Y 8/1), fine to medium grained, mild to moderate	
10056.9	96.0 R8-NQ 5 ft 98%	83	NR 1 3 2 0 0	94.45' - Fracture, 5 deg, smooth, planar, tight, slight organics on fracture surface (5-10%) 94.9' - Bedding plane, 5 deg, rough, undulating, organic staining, open 2", clay infill with limestone fragments 95.25' - Mechanical break 96.3' - Mechanical break 96.8' - Fracture, 5 deg, organic staining, bedding plane fracture, open 3", infill fines 97.0, 97.05' - Bedding plane (2), smooth, undulating, organics (5-10%) of surface of fracture, up to 1/8" open 97.8' - Fracture, 80 deg, rough, undulating, organic staining 98.5' - Mechanical break 99.1' - Mechanical break		HCl reaction, medium strong (R3), voids <1/16" 25-35% of surface, trace cavities to 1/2", trace organics 93.5-95.8' - yellowish gray, (5Y 8/1), very fine to fine grained, moderate HCl reaction, voids <1/16" predominately from 93.8-94.1', 10-20% of surface, <1% cavities to 1/2", trace fossil casts No Recovery 95.8-96.0' Limestone 96.0-100.9' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, weak to medium strong (R2 to R3), 10-20% voids (<1/16") over surface, trace cavities up to 1/2",	R8: 9 minutes
			(NR)	100.2' - Mechanical break		moderately fossiliferous (casts/molds)	

ORIENTATION: Vertical



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-04	SHEET	7	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 5.5	ft bg	s on 5/	03/07 START : 5/2/2007 END : 5/3	3/2007	7 LOGGER : M. Faurote, N. Jarzyn	iecki
<b>₹</b> Ω ⊊	(%)			DISCONTINUITIES	ρg	LITHOLOGY	COMMENTS
ELO N (#	AND 3≺ (3	_	ZES T	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	S O	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
			3	101.2' - Fracture, 5 deg, rough, undulating,	ш	No Recovery 100.9-101.0'	
-			0	bedding plane fracture, up to 1/8" open 101.7, 101.9' - Mechanical break (2), high	ш	<ul> <li>Limestone 101.0-106.0' - yellowish gray, (5Y</li> </ul>	1
			0	angle, tight	Ш	8/1), very fine to fine grained, strong to very strong HCl reaction, very	]
	R9-NQ 5 ft	85	1	103.25, 103.5, 104.45' - Mechanical break (3)		weak to weak (R1 to R2), voids	]
-	100%	00		· · · · · · · · · · · · · · · · · · ·	Ш	<1/16" 5-10%, trace cavities to 1/4", moderately fossiliferous	SC-1 collected at 103.5- 104.45' -
-			0	<u>-</u>	Ш	(casts/molds), <1% oval to circular, calcite filled voids	-
105_ -61.9				_	Н	—	R9: 4 minutes
-	100.0		>5	105.5' - Fractures or mechanical break,	Н	_	-
-	106.0			multiple fractures intersecting 106.1' - Fracture, 5 deg, smooth, undulating,	H	_ 106.0-111.0' - Same as 101.0-106.0'	-
-			3	bedding plane fracture, up to 1/4" open	П	<ul> <li>except yellowish gray, (5Y 8/1 to 5Y 7/2), trace planar bedding of variable</li> </ul>	-
-				106.25 - Fracture, 5 deg, smooth, undulating, bedding plane fracture, up to 1/2" open	Ħ	widths, trace cavities to 1"	1
-			1	106.5' - Fracture, 10 deg, smooth, undulating, bedding plane fracture, up to 1/4" open	H		1
	R10-NQ 5 ft	68	1	107.4' - Mechanical break	Ħ		]
-	100%	00	·	108.85' - Mechanical break or bedding plane,	H	_	_
-			4	5 deg, tight 109.15' - Fracture, 5 deg, smooth, undulating,	H	_	-
110 -66.9				bedding plane fracture, up to 1/4" open —	H		R10: 3 minutes
-			3	109.35 - Fracture, 5 deg, smooth, undulating, bedding plane fracture, up to 1/4" open	H	_	-
-	111.0			109.55 - Fracture, 30 deg, smooth, undulating, bedding plane fracture, except 1"	Ш	_ 111.0-115.8' - white to yellowish gray,	-
-			3	open	Ш	<ul> <li>(N9 to 5Y 8/1), very strong HCl reaction, extremely weak to weak</li> </ul>	-
-			. 40	109.8' - Fracture, 5 deg, smooth, undulating, bedding plane fracture, up to 1/4" open	Н	(R0 to R2), trace organics, <2%	1
			>10	110.05 - Fracture, high angle 110.45' - Mechanical break, 5 deg, tight	Ш	<ul> <li>voids to 1/16", trace wavy bedding,</li> <li>poorly fossiliferous (casts)</li> </ul>	]
_	R11-NQ 5 ft	57	>10	110.5' - Mechanical break, 65 deg, rough,	Н		_
-	96%	٥.		undulating, dark (possibly organic) 111.2' - Fracture zone, intersecting fractures	Н	_	_
-			0	up to 1/2" fragments 111.6, 111.95, 112.02, 112.25, 112.25, 112.4,	H	_	-
115_ -71.9				112.6, 112.7, 112.8' - Fracture (9), 0-5 deg, smooth, undulating, bedding plane fracture,	H		R11: 5 minutes
-	116.0		1	easily separates	H	_	-
-	116.0		NR.	112.85-113.2' - Fracture zone, intersecting fractures up to 1/2" fragments	H	<ul> <li>No Recovery 115.8-116.0'</li> <li>Limestone</li> </ul>	
1 -			1	·	Ħ	116.0-120.95' - Same as	1
-			0	116.95, 119.75, 119.8, 120.1, 120.8' - Fracture (5), smooth, undulating, bedding	Ш	<ul> <li>111.0-115.8' except fine to medium grained, 20-30% voids to 1/16", trace</li> </ul>	1
1 -			U	plane fracture, easily separates	Щ	cavities to 1/2", moderately fossiliferous	]
-	R12-NQ 5 ft	80	0		囯	-	]
-	99%				Ш	_	
-			2	-	団	_	-
120 -76.9				_	Ш		R12: 3 minutes
-	121.0		4	-	Ш	_	-
-	121.0		NR)	-	Ш	No Recovery 120.95-121.0'	
					$\Box$		
							l l



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-04	SHEET	8	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 5.5	ft bgs	on 5	/03/07 START: 5/2/2007 END: 5/3	3/200	LOGGER : M. Faurote, N. Jarzyn	iecki
≥0 ∷	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE ATIO	TH.,	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	JOE K	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT URF LEV	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	OIR	ď	2	<u> </u>	S		
_				120.9' - Fracture zone, intersecting fractures, fragments up to 1/2"	片	Limestone - 121.0-125.7' - yellowish gray, (5Y	_
_			2	121.2' - Fracture, 50 deg, smooth, undulating,	$\vdash$	8/1), fine to coarse grained, strong	_
_				up to 1/8" open 121.6' - Fracture or mechanical break,	Щ	HCl reaction, very weak to weak (R1 - to R2), medium to coarse grained	_
_	R13-NQ 5 ft	65	2	horizontal, bedding plane		zone at 123.2-124.0', trace voids	<u> </u>
_	94%	00	_	122.1' - Fracture, 5 deg, rough, undulating, bedding plane, up to 1/4" open	Н	<1/16", cavities to 1/4" <2% of surface, moderately fossiliferous	
			>5	122.4' - Fracture, 5 deg, rough, undulating,		(casts/molds), trace ovular voids with	
125			70	bedding plane, up to 1/4" open 123.2' - Fracture, 5 deg, rough, undulating, —	片	calcite infill	
-81.9			4	bedding plane, up to 1/4" open	$\vdash$		R13: 2 minutes
	126.0		NR	123.5' - Fracture, 60 deg, undeveloped fracture associated with 123.9'	Ш	No Recovery 125.7-126.0'	]
				123.9' - Fracture, 60 deg, rough, undulating,	$\blacksquare$	Limestone	]
			>10	up to 1/8" open 124.6-124.7' - Fracture zone, intersecting	$\vdash$	126.0-129.9' - Same as 121.0-125.7' except fine to medium grained, trace	1
_				fractures, fragments up to 1"	Ħ	organics	1
-			0	125.6-125.7' - Fracture zone, intersecting	Ħ	-	
-	R14-NQ			fractures, fragments up to 1" 126.4' - Fracture, 75 deg, rough, undulating,	╙	-	1
-	5 ft 98%	70	1	medium light gray staining	仜	-	1
-				126.5-126.7' - Fracture zone, intersecting fractures, fragments up to 1"		-	1
100			1	126.95' - Fractures (3), 70 deg, rough,	$\vdash$	-	-
130_ -86.9				undulating 128.4' - Mechanical break	F	No Recovery 129.9-131.0'	R14: 4 minutes
-	 		3	128.6' - Fracture, 70 deg, rough, undulating,	世	-	-
-	131.0		NR.	medium light gray staining 129.4' - Fractures (2), rough, undulating,	$\vdash$	Limestone	-
-			>10	medium light gray staining, intersecting	厈	- 131.0-135.75' - yellowish gray, (5Y	-
-				fractures 130.45' - Fracture, horizontal, rough,	口	7/2), fine to coarse grained, moderate HCl reaction, very weak to	-
-			1	undulating, bedding plane fracture	$\vdash$	moderate HCl reaction, very weak to - weak (R1 to R2), voids to 1/16" over	-
-	D45 NO			130.6' - Fracture, 75 deg, rough, undulating, medium light gray staining, up to 1/4" open	F	5-10% of surface, trace planar bedding of variable widths, rock is	-
-	R15-NQ 5 ft	13	3	130.9' - Fracture, horizontal, rough,	H	<ul><li>friable at 132.0-133.5', trace fossil</li></ul>	-
-	95%			undulating, bedding plane fracture, up to 1/4"	₽	casts	_
_			>10	open 131.2' - Fracture, horizontal, rough,	F	-	_
135				undulating, bedding plane fracture, up to 1/8"	口	_	]
-91. <del>9</del>			5	open 131.3-131.5' - Fracture zone, intersecting -		_	R15: 3 minutes
	136.0		NR	fractures, up to 1" fragments	F	No Recovery 135.75-136.0'	
			0	131.7-131.85' - Fracture zone, intersecting fractures, up to 1/2" fragments	Ħ	Limestone	_
			0	132.6' - Fracture, 5 deg, bedding plane	片	136.0-140.7' - Same as 131.0-135.75' except mottled with	
			1	fracture, open less than 1/8" 133.1' - Fracture, 55 deg, rough, undulating	F	light olive gray (5Y 5/2), becoming	
				133.8' - Fracture, 0-5 deg, rough, undulating,	口	predominantly light olive gray at 138.8-139.1' and 140.1-140.35', trace	1
	R16-NQ	70	•	bedding plane fracture, up to 1/4" open 133.9' - Fracture, 55 deg, rough, undulating,	Н	cavities to 1/4", 5-10% coverage of	]
	5 ft 94%	76	2	up to 1/2" open	$\vdash$	voids to 1/2" with calcite infill from 139.1-140.1'	1
				134.1-134.95' - Fracture zone, intersecting fractures	Ħ		]
140			3	135.2, 135.25' - Fracture (2), 5 deg, bedding	世		1
-96.9			1	plane fracture, open less than 1/8"	仠	_	R16: 3 minutes
-	141.0		NR	135.3' - Fracture, 25 deg, rough, undulating, bedding plane fracture	口	No Pocovory 140 7 144 0'	
-	1-11.0		INIT	135.55 - Fracture, <5 deg, rough, undulating,	世	_ No Recovery 140.7-141.0'	
				bedding plane fracture			
1							1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-04	SHEET	9	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS: 5.5	ft bgs	s on 5	/03/07 START : 5/2/2007 END : 5/3	3/200	LOGGER : M. Faurote, N. Jarzyn	iecki
\$ O €	(%			DISCONTINUITIES	LOG	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-			>10	135.65' - Fracture, <5 deg, rough, undulating, bedding plane fracture 136.9' - Mechanical break		Limestone 141.0-145.4' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 8/1), very	-
-	R17-NQ 5 ft 88%	45	>10	137.75' - Fracture, 5-10 deg, rough, undulating, bedding plane fracture, up to 1/4" - open 138.2' - Mechanical break		fine to fine grained, mild to moderate  HCl reaction, strong (R4), trace organics, voids to <1/16" over 5-10% of surface, trace cavities to 1", highly	-
- 145	0076		3	138.5' - Mechanical break - 138.55' - Bedding plane, 5 deg, rough, undulating 138.75, 139.1' - Bedding plane (2), 0-5 deg, —		to moderately fossiliferous decreasing with depth, trace laminar bedding	- - -
-101 <u>.9</u> -	146.0		1 NR	rough, planar 140.15, 140.35' - Bedding plane (2), 0-5 deg,	Ħ	No Recovery 145.4-146.0'	R17: 7 minutes
-	. 10.0		>10	rough, planar, up to 1/2" open 140.2' - Bedding plane, 5 deg, rough, undulating 141.5' - Fracture, 30 deg, up to 1/4" open		Limestone 146.0-146.5' - Same as 141.0-145.4' except only trace voids to 1/8" size	- -
_			2	142.2-142.3' - Fracture zone, intersecting fractures, up to 1/2" fragments 142.4' - Fracture, 0-5 deg, bedding plane	intersecting 146.5-149.4' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y		-
-	R18-NQ 5 ft 80%	53	2	fracture, olive gray (5Y 3/2) organic staining, up to 1/4" open - 142.6' - Fracture, 0-5 deg, organic staining, _		HCl reaction, medium strong to strong (R3 to R4), porous, voids <1/16" 20-30% of surface, cavities to 1/4" 10% of surface, moderately	-
150 -106.9			4	up to 1/4" open 142.85-142.45' - Fracture zone, intersecting fractures, up to 1/2" fragments 143.95-143.6' - Fracture zone, intersecting		- fossiliferous (casts/molds) 149.4-150.0' - Same as 146.0-146.5' No Recovery 150.0-151.0'	R18: 3 minutes
-	151.0		NR	fractures, up to 1/2" fragments  143.7' - Fracture, 0-5 deg, organic staining, tight	Ė	Limestone	-
-			2	143.9' - Fracture, 0-5 deg, organic staining, up to 1/8" open 144.0' - Fracture, 0-5 deg, organic staining,		<ul> <li>151.0-155.0' - yellowish gray, (5Y 8/1 to 5Y 7/2), fine to medium grained, mild HCI reaction, medium strong to</li> </ul>	- -
-	R19-NQ 5 ft	23	>10 5	up to 1/8" open 144.3' - Fracture, 0-5 deg, organic staining, up to 1/4" open 144.5' - Fracture, 15 deg, organic staining,		<ul> <li>strong (R3 to R4), 10% black/olive gray organic staining, voids to 1/16" over 5-10% of surface, zone of moderately competent rock with</li> </ul>	-
-	80%	23	4	tight 144.8' - Mechanical break 145.0' - Fracture, 15 deg, organic stanning, 145.0' - Fracture, 15 deg, possible organic		wavy laminar bedding planes at 153.0-153.5'	-
155 <u> </u>			NR	stain on 50% of surface, up to 1/4" open 146.0-146.3' - Fracture zone, intersecting fractures, fragments up to 1/2"		No Recovery 155.0-156.0'	R19: 4 minutes
- -	156.0		3	146.9, 146.95' - Fracture (2), 0-5 deg, rough, undulating, bedding plane fractures, up to 1/8" open 		Limestone - 156.0-157.2' - dusky yellow, (5Y 8/1),	SC-2 collected at 156.3-
-			1	up to 1/4" open 147.95' - Fracture, 5 deg, rough, undulating, up to 1/4" open		medium grained, mild HCl reaction, weak (R2), voids to 1/16" 20-30%, cavity to 1/2" 5-10%, moderately fossiliferous (casts/molds)	157.23'  -  -
_ _ _	R20-NQ 5 ft 42%	37	0	148.1, 149.1' - Fracture (2), 5 deg, rough, undulating, up to 1/8" open 148.3' - Fracture, 20 deg, rough, undulating,		157.2-158.1' - yellowish gray, (5Y 8/1), fine to medium grained, moderate to strong HCl reaction,	- - -
160 -116.9			NR	up to 1/2" open 148.5' - Fracture, 50-60 deg, undeveloped or healed 149.3, 149.4, 149.8' - Fracture (3), 5 deg,		voids to <1/16" 5-10% of surface, trace cavities to 1/4", trace organics, trace fossils (casts) No Recovery 158.1-161.0'	R20: 6 minutes
-	161.0			rough, undulating, 1/8"-1/4" open 151.6' - Fracture, 70-80 deg, rough, undulating, organic stain on 95% of fracture		-	-
				surface, up to 1/4" open			



PROJECT NUMBER:

33884.FL BORING NUMBER:

E-04 SHEET 10 OF 12

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS: 5.5	ft bg	s on 5/	03/07 START : 5/2/2007 END : 5	/3/200	LOGGER : M. Faurote, N. Jarzyn	iecki
≳ D ≨	(%)			DISCONTINUITIES	၂ ဗ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE	: RU :TH, :VEF	(%) □	70	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT URF LEV	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
В	OIR	ď			S		
_			3	151.65' - Fracture, 5 deg, rough, undulating, organic staining, bedding plane fracture,	$\perp$	Limestone - 161.0-164.6' - yellowish gray with	
_			4	intersecting, <1/8" open, olive gray (5 Y 3/2)	$\bot$	light olive gray mottling, (5Y 7/2 with	
_				152.0-152.2' - Fracture zone, fragments up to 1", intersecting fractures	$\perp$	5Y 5/2), fine to medium grained, mild to moderate HCl reaction, medium	
_	R21-NQ 5 ft	16	>10	152.25' - Fracture, <5 deg, rough, undulating,		strong to strong (R3 to R4), 5-10%	
	72%	10	10	bedding plane fracture, <1/8" open 152.4' - Fracture, <5 deg, rough, undulating,	$\vdash$	voids to <1/16" decreasing with depth, <1% cavities to 1/4", mildly	
			4	bedding plane fracture, up to <1/4" open		fossiliferous, trace planar bedding	
165				152.45 - Fracture or mechanical break, <5	1	No Recovery 164.6-166.0'	
-121.9			NR	deg, rough, undulating, bedding plane - fracture, up to <1/4" open	T		R21: 7 minutes
_	166.0			152.55' - Fracture, <5 deg, rough, undulating,	$\perp$	-	
_	100.0			bedding plane fracture, tight 152.9' - Fracture zone, fragments up to 1",	1	_ Limestone	
-			5	intersecting fractures	二	- 166.0-170.8' - yellowish gray and	
_				153' - Fracture zone, fragments up to 1", intersecting fractures	+	dusky yellow in alternating zones of variable widths (3"-8"), (5Y 7/2 and	
-			1	153.05, 153.15, 153.3' - Fracture (3), <5 deg,	+	<ul> <li>5Y 6/4), moderate HCl reaction,</li> </ul>	
_	R22-NQ			rough, undulating, bedding plane fracture,	+—	medium strong to strong (R3 to R4), medium strong (R3) zone from	
_	5 ft	62	2	<1/8" open 153.4' - Fracture, <5 deg, rough, undulating,	-	- 166.5-167.2', voids to <1/16" 10-20%	
_	96%			bedding plane fracture, up to 1/2" open	+	decreasing with depth, trace cavities to 1/2", mild to moderately	
_			3	153.5' - Mechanical break 153.6' - Fracture, 10 deg, rough, undulating,		<ul> <li>fossiliferous decreasing with depth,</li> </ul>	
170 -126.9				bedding plane fracture, up to 1/2" open _	_	planar bedding of variable widths	
-120.9			0	154.2, 154.3' - Fracture (2), 10 deg, rough, undulating, bedding plane fracture, up to 1/4"	$\perp$	<u>-</u>	R22: 7 minutes
_	171.0		NR.	open	上	- No Recovery 170.8-171.0'	
_			>5	154.45' - Fracture, 85 deg, rough, undulating, remineralization, olive gray (5Y 3/2) organic	$\perp$	Limestone	
_				staining	$\bot$	171.0-176.0' - yellowish gray and dusky yellow in alternating zones of	
_			>10	154.65' - Fracture or bedding plane, 30 deg, smooth to rough, undulating, up to 1" open	上	variable widths (<4"-6"), (5Y 7/2 and	
			- 10	156.05' - Fracture, 5-10 deg, up to 1/4" open		5Y 6/4), fine to medium grained, moderate HCl reaction, medium	
	R23-NQ	45	3	156.15, 156.3' - Fracture (2), 5-10 deg, up to	$\vdash$	strong to strong (R3 to R4), voids	
_	5 ft 100%	45		1/2" open 157.25' - Fracture, 5 deg, smooth, undulating,	丁	<1/16" 10-20% of surface, trace organics, poorly to moderately	
_				bedding plane fracture along abrupt bedding,	$\perp$	fossiliferous (casts/molds)	
175			3	up to 1/4" open 157.4' - Fracture, healed or undeveloped,	$\top$		
-131.9				olive gray (5Y 3/2) organic staining			R23: 5 minutes
-	176.0		1	161.3' - Fracture, 10 deg, rough, undulating, bedding plane, up to 2/3" open	1	-	
-	170.0			161.55' - Fracture, 40 deg, rough, undulating,	+	176.0-180.7' - Same as 171.0-176.0'	
-			2	up to 1/2" open 161.8' - Fracture or bedding plane, up to 1/2"	世	except trace cavities to 1/2", trace	
-			$\vdash$	open	+	light olive gray (5Y 5/2) laminae, zone of wavy bedding with possible	
-			2	162.2, 162.45' - Fracture (2), <5 deg, rough,	干	- cross bedding from 176.5-176.95'	
_	R24-NQ			undulating, bedding planes, up to <1/2" open 162.3' - Fracture, 80-90 deg, partially healed	士	_	
-	5 ft	73	1	162.75' - Fracture, 10 deg, rough, undulating,	+	_	
-	94%		$\vdash\vdash\vdash$	bedding plane 163.15' - Fracture, 10 deg, rough, undulating,	$\blacksquare$	_	
_			2	bedding plane	$\perp$	-	
180_ -136.9			$\sqcup$	163.35-163.5' - Fracture zone, fractures intersecting, up to 1" fragments	+	_	D24: 6 minutes -
-130.9			2	163.8' - Fracture, 10 deg, rough, undulating,	井	-	R24: 6 minutes
_	181.0		NR	bedding plane, up to 2/3" open 163.9' - Fracture, 40 deg, rough, undulating,	上	No Recovery 180.7-181.0'	
_				up to 1/2" open	$\vdash$		
			: <b>I</b>				I



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-04	SHEET	11	OF	12	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING	METHOD A	ND E	JUIPN	ENT : Dietrich D-50 S/N 232, mud rotary, NQ too	ols, HW	casin	]	ORIENTATION : Vertical
WATER	LEVELS : 5.5	ft bgs	s on 5	03/07 START : 5/2/2007 E	END : 5/3	3/200	7 LOGGER : M. Faurote, N. Jarzyr	niecki
	_			DISCONTINUITIES			LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		m	DESCRIPTION		SYMBOLIC LOG		-
ON A	₹₹¥	_	FRACTURES PER FOOT	DESCRIPTION		CL	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A TIC	贤툿쑮	(%) Q	[ <u>₹</u> 8	DEPTH, TYPE, ORIENTATION, ROUGHNES	SS.	징	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FFF	888	αD	AC R	PLANARITY, INFILLING MATERIAL AND	)	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	822	ď	뜐낊	THICKNESS, SURFACE STAINING, AND TIGHT	INESS	Ś	CHARACTERISTICS	BROLO, FEOT REGUETO, ETC.
			9	163.95' - Fracture, 10 deg, rough, undula	ting,		Limestone	
-				along bedding plane, <1/8" open	-	Н	<ul> <li>181.0-185.6' - dusky yellow</li> </ul>	-
_			2	164.05' - Fracture, 80-90 deg		H	transitioning with depth to yellowish	-
				164.2, 164.25' - Fracture (2), 10 deg, rougundulating, bedding plane	gn, _		gray, (5Y 6/4 to 5Y 7/2), fine to  medium grained, moderate HCl	
	R25-NG			164.35' - Fracture, 80-90 deg		Н	reaction, weak to medium strong (R2	
-	5 ft	37	2	166.1, 166.15, 166.25' - Mechanical brea	k -	Н	to R3), weak (R2) zone from	1
-	92%			(3), <5 deg, smooth, planar, bedding plan			- 181.9-182.9', voids <1/16" 10-20%	-
			5	166.5' - Fracture, <5 deg, rough, undulati	ng,	Н	increasing with depth, highly	
185				bedding plane, 1/4" open	·0\		fossiliferous from 183.2-184.8',	
-141.9			>10	116.7, 167.1, 169.1' - Mechanical break ( <5 deg, smooth, planar, bedding plane, u			<ul> <li>casts/molds up to 1/2", zones of planar bedding with variable</li> </ul>	R25: 5 minutes
-				1/8" open	- J	Н	thickness from 181.0-181.25',	1 -
I -	186.0		NR	167.15-167.7' - Fracture, 80-90 deg, smo	oth, ,	Щ	182.9-183.2', and 184.7-185.6'	
				planar, bedding plane, up to 1/8" open			No Recovery 185.6-186.0'	
				168.15' - Fracture, <5 deg, rough, undula	iting,		Bottom of Boring at 186.0 ft bgs on	1
-				bedding plane, 1/4" open	-	i	- 5/3/2007	1
-				168.5' - Mechanical break 168.7' - Mechanical break, <5 deg, smooth	th.		_	-
I _				planar, bedding plane	·  _			
				169.45, 107.35' - Fracture (2), <5 deg, ro	ugh,			
				undulating, undeveloped or healed, bedd	ing	1	=	1
-				plane fractures	-	l	-	-
_				169.5' - Mechanical break, 10 deg, beddii plane	ng		_	
				169.6' - Fracture, 10 deg, rough, undulation	na.			
				bedding plane	, T	1		
-				169.8' - Mechanical break, <5 deg, smooth	th, -	i	_	1
-				planar, bedding plane	-	1	_	-
I _				171.45-171.55 - Fracture zone, intersecti fractures, up to 1/2" fragments	ing		_	
				171.85' - Fracture, <5 deg, rough, undula	tina			
-				olive gray (5Y 3/2) organic staining on bo		1	=	1
-				surface, up to 1/2" open	-	1	=	-
_				172.15' - Fracture, <5 deg, rough, undula	ting _		_	_
				to planar, bedding plane, possible remineralization				
				172.4' - Fracture, 10 deg, rough, undulati	na   -	1		
-				bedding plane, possible remineralization	g,  _	1	-	-
-				172.5-172.6' - Fracture zone, intersecting	ı  -	1	_	-
				fractures, up to 1/2" fragments	. ↓		_	
				172.8, 174.1' - Fracture (2), <5 deg, rough	n,			
1 7				undulating, bedding plane, possible remineralization, up to 1/8" open	-	1		1
-				173.0' - Fracture, 50 deg, rough, undulati	ng,  -	1	-	-
-				less than 1/8" open	J -		_	-
				173.1' - Fracture, 80-90 deg, rough,			_	
				undulating, tight 173.2' - Fracture, <5 deg, rough, undulati	-			1
-				bedding plane	119,  -	1	-	1 1
-				173.5' - Mechanical break	-		_	-
_				174.75, 174.8' - Fracture (2), <5 deg, rough	gh, 📙		<u> </u>	]
				undulating, bedding plane, possible				
1 7				remineralization, up to 1/4" open	-			1
-				175.7-175.75' - Fracture, intersecting fractures, up to 1/4" fragments	-	1	-	-
-				176.15' - Fracture, <5 deg, smooth,	<u> </u>			-
				undulating, bedding plane, up to 1/8" ope	n		_	
				176.7, 177.4, 179.15' - Fracture (3), <5 de	eq.			1
-				smooth, undulating, bedding plane, up to	1/4"   -		-	1 -1
-				lopen	L	$\vdash$		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-04	SHEET	12	OF	12	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723843.2 N, 457904.3 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING	NIE I NOD A	ND E	ארוטג	/IENT: Dietrich D-50 S/N 232, mud rotary, NQ tools, HW o	casin	y	ORIENTATION : Vertical
WATER	LEVELS : 5.5	ft ba	s on 5	/03/07 START : 5/2/2007 END : 5/3	3/200	7 LOGGER : M. Faurote, N. Jarzyn	iecki
		, it by	011 0				
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	ဗ္ဗ	LITHOLOGY	COMMENTS
OA S	→ N >		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OLZE AND DEDTH OF GAGING
쀪병은	Ş,+R	Q D (%)	되었		Ę	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
ΗĂΕ	ä E S	ا ا	FC	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	ВО	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
E RE		Ø	RA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	×Μ	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ОΩШ	07%	ď	ΗΔ		S	CHARACTERISTICS	
				177.25' - Fracture, vertical, rough, undulating			
_				178.05' - Mechanical break		-	-
_				178.4' - Mechanical break		_	-
				178.5' - Mechanical break			
-	i			178.6, 179.35, 180.55' - Fracture (3), <5 deg,		-	-
-	-			smooth, undulating, bedding plane, up to 1/8" _ open		-	-
				179.25' - Fracture, <5 deg, smooth,			_
				undulating, bedding plane, tight			
_				180.25' - Fracture, 50 deg, rough, undulating		-	-
_				181.05, 181.15, 181.6, 181.7, 181.9, 182.95 <sup>°</sup> -			
				Fracture (6), <5 deg, rough to smooth,			
				undulating			_
-				181.4' - Fracture, 65-75 deg, rough, –		-	-
-				undulating		<u></u>	-
				181.65' - Fracture, 85 deg, rough, undulating 181.8' - Fracture, 85 deg, rough, undulating, 181.8'			
1 7				open up to 1/4"		-	· -
-				182.4, 183.1, 184.1, 184.5' - Fracture (4), <5		-	-
				deg, rough to smooth, undulating			_
				183.05' - Fracture, 75-85 deg, rough,			
-				undulating		-	-
_				183.5' - Mechanical break		-	-
				184.6' - Fracture, 60 deg, rough, undulating			
				184.85-185.6' - Fracture zone, <10 deg,		<del>-</del>	_
-	-			rough to smooth, undulating, bedding plane		<del>_</del>	_
_				fractures			_
_				-		-	-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-05	SHEET	1	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 4-7/8" drag bit ORIENTATION: Vertical

						auto hammer, AWJ rods, 4	-		ORIENTATION: Vertical
WATER	LEVELS	: 1.61 π	ogs on 6/		START : 4/10/2007	END: 4/18/2007 SOIL DESCRIPTION	LOGGE	K∶K. 	Bitely, K. Coke, A. Erickson, W. Elliott  COMMENTS
충급운	CAMPLE	INTERNA	.1 (6)	STANDARD PENETRATION		SOIL DESCRIPTION		8	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	SOIL NAME, USCS GROUP SYMBOL, COLOR,				SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,	
ATI ATI		RECOVI	<u> </u>		MOISTURE C	ONTENT, RELATIVE DEN	ISITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
P. C. C. C. C. C. C. C. C. C. C. C. C. C.			#TYPE	6"-6"-6" (N)	CONSISTENCY	, SOIL STRUCTURE, MIN	ERALOGY	SYN	INSTRUMENTATION
42.6	0.0					and With Organics (SP)			SS-1: First 6" was weight of hammer
-		1.3	SS-1	0-2-3		ack grading to medium I		1	<del>-</del>
-	1.5			(5)	20-30% organics,	, fines decreasing with d			Water level is based on Ground Water
-	1.0				∖sand, roots		/	1	Monitoring at LNP site (FSAR Table - 2.4.12.08)
-								1	
-								1	-
-								1	-
-								1	-
-								1	-
5	5.0							1	-
37.6	0.0				Poorly Graded S		_		
-		1.0	SS-2	2-3-3		ellowish brown, (10YR 6) ine to fine grained, 3% m		1	-
-	6.5			(6)	\plastic fines, silica	a sand			<u>-</u>
-	0.0				Fat Clay With Sa	nd (CH) ue to pale olive, (5B 6/2	to 10Y 6/2)	1	-
-					moist, medium sti	iff, high plasticity, no dila		1	-
-					very fine silica sa	nd		1	-
_								1	-
-								1	_
-								1	-
10	10.0							1	-
32.6					Clayey Sand (SC	(50.00		///	_
-		1.2	SS-3	5-7-8 (15)	10-10.25' - pale b	lue to pale olive, (5B 6/2 ense, fine to medium gra	to 10Y 6/2),   ined. 24%	1	-
_	11.5			(13)		fines, iron cemented sa		1	· -
_					Poorly Graded S	<b>and (SP)</b> <sup>,</sup> pale orange, (10YR 8/2	), wet.		_
					medium dense, v	ery fine to fine grained, t	race		_
					nonplastic fines, t	trace black mineral grain	S		
								1	
									]
									]
15	15.0								
27.6				0.00	Poorly Graded S	and With Silt (SP-SM) pale orange to pale yell	owieh		
		1.0	SS-4	6-9-9 (18)	brown, (10YR 8/2	to 10YR 6/2), wet, med	ium dense,		_
	16.5			()	very fine to fine g	rained, 6% nonplastic fir	nes, silica		
					Sandy Lean Clay	(CL)			
					15.55-16.0' - pale	yellowish brown, (10YR nedium plasticity, slow di	6/2), wet,		
					40-45% very fine	to fine silica sand	iaiaiicy,		
								]	
_								1	
								1	
20									



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-05	SHEET	2	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 4-7/8" drag bit ORIENTATION: Vertical

WATER	LEVELS	: 1.61 ft l	ogs on 6/	14/07	START : 4/10/2007	END : 4/18/2007	LOGGER	: R.	Bitely, K. Coke, A. Erickson, W. Elliott
300				STANDARD		SOIL DESCRIPTION		Ō	COMMENTS
AN AN AN AN AN AN AN AN AN AN AN AN AN A	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, CC		GROUP SYMBOL COLOR		DEPTH OF CASING, DRILLING RATE,
H BE ATIC		RECOVE	ERY (ft)		MOISTURE	E CONTENT. RELATIVE DEN	ISITY OR	BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTEN	NCY, SOIL STRUCTURE, MIN	ERALOGY	SYMBOLIC LOG	INSTRUMENTATION
22.6	20.0			( )	Silty Sand (SN	M)		П	
_		1.0	SS-5	6-9-10 (19)	20.0-21.0' - pal medium dense	lle yellowish brown, (10YR 6 e, very fine to fine grained, 3	6/2), wet,		1
_	21.5			(13)	nonplastic fines	es, silica sand			_
							_		
l _							_		_
-							_		_
-							_		-
-							-		-
-							-		-
25 <u> </u>	25.0				Silty Sand (SN	М)			-
-		1.0	SS-6	6-7-6	25.0-26.0' - Sa	ame as 20.0-21.0'	_		-
-	26.5			(13)				1.11	1
							_	İ	
							_		]
_							_		_
_							_		_
-							_		-
							-		-
30 <u> </u>	30.0				Lean Clay (CL	.)			-
-		1.3	SS-7	4-6-8	30.0-31.3' - pal	le yellowish brown to dark yng greenish gray in last 0.1'	ellowish -		-
-	31.5			(14)	_ to 10YR 1/2 to	5G 6/1), moist, stiff, mediu	m plasticity,		-
-	01.0				\no dilatancy, 5-	5-10% very fine silica sand	/ -	l	_
							_		
_							_		
-							_		_
-							_		_
							-		-
35 7.6	35.0				Silty Sand (SM	M)			-
-		1.2	SS-8	4-4-4	35.0-36.2' - liah	ht olive gray, (3Y 5/2), mois e to fine grained, 30% low p	t to wet, -		-
-	36.5			(8)	¬ silica sand, me	edium bluish gray (5B 5/1) c	clay lens		-
-	00.0				\from 35.4-35.6	5'			<del>-</del>
_							_		]
							<del>-</del>		
] _							_		
_							_		_
-							_		_
40								$\vdash$	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-05	SHEET	3	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 4-7/8" drag bit ORIENTATION : Vertical

DRILLING METHOD AND EQUIPMENT. CME 35 5/N 252545, HIND TOTAL THE AMOUNT OF THE AMOUNT										
					START : 4/10/2007	END : 4/18/2007 SOIL DESCRIPTION	LOGGE	K : R	. Bitely, K. Coke, A. Erickson, W. Elliott  COMMENTS	
≥¤≎	SAMPLE INTERVAL (ft)  STANDARD PENETRATION TEST RESULTS			STANDARD PENETRATION		SOIL DESCRIPTION		_	COIVIIVIEIV15	
DEPTH BELOW SURFACE AND ELEVATION (#)				TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,	
ACE	RECOVE		ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		ISITY OR	ğ	DRILLING FLUID LOSS, TESTS, AND	
FRE			#TYPE	6"-6"-6"	CONSISTEN	ICY, SOIL STRUCTURE, MIN	IERALOGY	Ĭ	INSTRUMENTATION	
2.6	40.0			(N)	Lean Clay (CL)	`		00		
	40.0			2-4-5	40.0-41.5' - dai	rk gray, (N3), moist, stiff, m	nedium	-1//	-	
_		1.5	SS-9	(9)	plasticity, no di	ilatancy, 40.7-40.8' organic	soil (OH)	-1//	-	
_	41.5				40.45- 40.65'	e gray (5Y 6/1), brittle orga	anic layer		4	
_					<u> </u>			]	_	
_								1	1	
_								1	1	
-								1	1	
45	4E 0							1		
-2.4	45.0				Lean Clay (CL	.)		1//	╡	
-		1.5	SS-10	0-1-2	45.0-46.5' - Sa	me as 40.0-41.5' except 45	5.2-45.6'	<b>-</b>	-	
-		1.5	33-10	(3)	seam of silty sa	and (SM), light olive gray (5 ca sands, 20% nonplastic fi	ōY 6/1), very	-1//	-	
-	46.5				inic to fine sine	3a 3ana3, 20 / monplastic ii		- 1//	4	
_								4		
_								1	_	
_									_	
_								_		
-								1	1	
50	50.0							1	1	
-7.4	00.0				Silty Sand (SN	Л)	-	TI	1	
-		1.5	SS-11	3-4-7	50.0-50.65' - da	ark gray, (N3), moist to well to fine grained, 17% low	t, medium	-	1	
-	F4 F			(11)	possible organi	ics, 1/4" clayey organic sea	am, silica	ΉП	]	
-	51.5				sand		//i	+~	4	
-					Organic Soil (0	<b>OL)</b> dusky yellowish brown, (10	VP 2/2)	+	-	
-					moist, stiff, low	to medium plasticity, rapid	dilatancy	4	-	
-					Elastic Silt (MI	H)		4		
_					50.85-51.4' - ye	elĺowish gray, (5Y 7/2), moi sticity, rapid dilatancy, mild	ist, stiff, low	1	_	
-					HCl reaction, c		io moderate	1		
I _					Organic Soil (	OL)	p	]		
55	55.0				51.4-51.5' - Sa   (5Y 2/1)	me as 50.65-50.85' except	olive black,		]	
-12.4					Silt With Sand			$\prod$	1	
		1.5	SS-12	14-27-36 (63)		ht olive gray, (5Y 5/2), mois I dilatancy, mild HCl reactio			1	
_	56.5			(03)		i dilatancy, mild HOI reaction id, trace organics	ni, 20 % Vely	1	1	
-	55.0					<u> </u>		†	1	
-								1		
-								1		
-								1		
-								+	-	
-								+	Driller's Remark: Harder drilling at 59.0'	
_								4	Dimer a Nemark. Harder drilling at 59.0	
60							_	$\bot$		



PROJECT NUMBER:	BORING NUMBER:			
338884 FI	F-05	CHEET	4 OF 11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 4-7/8" drag bit ORIENTATION: Vertical

DRILLING METHOD AND EQUIPMENT. CME 35 5/N 252545, HIND TOTAL 14/0/2007.  CARD 1-4/0/2007.										
					START : 4/10/2007	END : 4/18/2007	LOGGER	₹∶R. 	Bitely, K. Coke, A. Erickson, W. Elliott	
30₽	SAMPLE INTERVAL (ft)  SAMPLE INTERVAL (ft)  STANDARD PENETRATION TEST RESULTS			STANDARD PENETRATION	SOIL DESCRIPTION  SOIL NAME, USCS GROUP SYMBOL, COLOR,			99	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)				TEST RESULTS			OP	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,	
ACE ATIO		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSIT		Y OR	Ω	DRILLING FLUID LOSS, TESTS, AND	
FFR			#TYPE	6"-6"-6"	CONSISTENCY	, SOIL STRUCTURE, MINERA	ALOGY	¥₩	INSTRUMENTATION	
	20.0			(N)	Ciltu Cond And Li	imagtana (CM)		S		
-17.4	60.0			26-29-30	Silty Sand And Li 60.0-61.5' - moder	rate yellowish brown, (10YF	R 5/4).		_	
l _		1.5	SS-13	(59)	wet, very dense, f	fine to coarse grained, mild I	HCI "		_	
	61.5				reaction, 25-30%	low plastic fines, 30-40% stone, 1/4" organic layer at	61 2'			
					gravei-sized little s	Storie, 1/4 Organic layer at	01.3			
-							-	1	1	
-							-	1	-	
-							-	ł	Driller's Remark: Reports clay at 63.0'	
-							-	┨	-	
-							-	1	-	
_							-		_	
65	65.0							<u> </u>		
-22.4					Elastic Silt (MH)	rate yellowish brown, (10YF	) 5/4\)	Щ		
		1.5	SS-14	2-10-10 (20)	wet, very stiff, low	to medium plasticity, rapid	· //			
-	66.5			(20)	dilatancy, modera	te HCl reaction, carbonate	material /	Ъ	1	
-					Organic Soil (OH)	<b>l)</b> vnish black, (5YR 2/1), mois	t soft	Γ'	1	
-					high plasticity, slo	wilstriblack, (31102/1), mois	1, 3011,    -	1	1	
-					Limestone Fragm	nents		ł	-	
-					65.65-66.50' - yell grained, mild HCI	lowish brown, (10YR 5/4), fire reaction	ne   -	1	-	
-					grained, mild HCr	Teaction		┨	-	
-							-	ł	-	
_							-	1	_	
70	70.0							<u> </u>	_	
-27.4					Silt With Sand (M	<b>/IL)</b> rate yellowish brown, (10YF	0.5/4\			
		1.0	SS-15	11-16-7 (23)	wet, very stiff, low	plasticity, rapid dilatancy, n	noderate			
	71.5			(20)		20% fine to coarse sand-size				
					∖ fine gravei-sized ii ∖material	limestone fragments, carbor	iate / -	1	1	
-					(matorial			1	1	
-							-	1	-	
-							-	ł	-	
-							-	ł	Driller's Remark: Lost circulation at 73.5'	
-							-	-	Dillici 3 Nemark. Lost difculation at 73.3	
-							-	1	_	
75	75.0							<b>L.</b> ,		
-32.4				4.0.0	Silt With Sand (M	<b>/IL)</b> rate yellowish brown to dusl	O/			
		1.1	SS-16	1-3-2 (5)	yellowish brown, (	(10YR 5/4 to 10YR 2/2), wet	<b>,</b>		]	
	76.5			(3)	medium stiff, fine	to medium grained, low plas		┸	1	
-	. 5.0					nild HCl reaction, trace fine stone; organic seam at 75.8	5-76 0'	1	1	
-					1914101 01204 III 1100	storio, organio ocum at 70.0		1		
-							-	1	-	
-							-	ł		
-							-	ł	-	
-							-	1	Driller's Remark: Hard zone 79.0-80.0'	
-							-	1	Dilliel S Remark. Hard 2018 79.0-80.0	
80								_		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-05	SHEET	5	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	ATER LEVELS: 1.61 ft bgs on 6/14/07 START: 4/10/2007 END: 4/18/2007 LOGGER: R. Bitely, K. Coke, A. Erickson, W. Elliott											
				STANDARD	SOIL DESCRIPTION		COMMENTS					
AND N (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LIGOS OPOLID CYMPOL COLOR	CLO	DEDTILOF CASING POULING DATE					
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30LI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND					
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION					
-37.4	80.0	0.9	SS-17	41-50-50	Silty Sand And Limestone (SM) 80.0-80.9' - moderate yellowish brown, (10YR 5/4),		Break for evening 17:30 on 4/10/2007					
_	80.8			(100)	wet very dense fine to coarse grained mild HCI	Ш	_					
_					reaction, 25% low plastic fines, 35% of sample is fine to coarse gravel-sized limestone fragments	-						
-					Begin Rock Coring at 81.5 ft bgs	-	-					
-					See the next sheet for the rock core log	ł	-					
-						┨	-					
-						ł	-					
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85						1	-					
-42.4					_	1						
-						1	]					
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90 <u> </u>					_	ł	_					
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PROJECT NUMBER:

338884.FL

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, NQ tools, HW casing

WATER	LEVELS : 1.6	1 ft b	gs on (	6/14/07 START : 4/10/2007 END : 4/	18/20	07 LOGGER : R. Bitely, K. Coke, A.	Erickson, W. Elliott
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - 85_ -42.4	81.5 R1-NQ 4 ft 45% 85.5	13	>10 >10 NR >10	81.6' - Mechanical break, 75 deg, smooth, undulating 82.1-82.5' - Fracture zone (>5), rough, undulating, 2" gravel-sized fragments, angular 82.5-82.8' - Fracture or mechanical break, smooth, undulating, open with 1/2"-2" opening 83.0-83.2' - Fracture or mechanical break, very fine to fine grained  85.5-85.9' - Fracture zone, rough, undulating, 1-1/2" gravel-sized fragments, mostly <1"		Limestone  81.5-83.3' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCI reaction, very weak to weak (R1 to R2), voids increasing with depth along the surface 83.0-83.3' - yellowish gray, (5Y 7/2)  No Recovery 83.3-85.5'  Limestone  85.5-85.9' - moderate yellowish	Continue drilling, switch to rock coring 04/11/07 at - 08:00 R1: 8 minutes
- - - - 90 -47.4	R2-NQ 5 ft 8% 90.5	0	NR			brown, (10YR 5/4), fine to medium grained, mild HCI reaction, very weak to weak (R1 to R2), voids cover 5% surface area  No Recovery 85.9-90.5'	R2: 2 minutes
- - - - 95_ -52.4	R3-NQ 5 ft 54%	24	>5 >10 0 NR	90.5-91.0' - Fracture zone (>5), smooth, undulating, 2" gravel-sized fragments, angular 91.5, 91.7, 92.4' - Fracture or mechanical break (3), smooth, undulating  93.0' - Mechanical break		Limestone 90.5-92.5' - Same as 85.5-85.9' except moderately fossiliferous (molds and casts)  92.5-93.2' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCI reaction, weak (R2), small (1/16") voids over 5% of the surface, trace silt No Recovery 93.2-95.5'	R3: 8 minutes
100	95.5 R4-NQ 5 ft 100%	88	1 >2 4 2 >10 6	95.7' - Mechanical break 95.9, 96.8, 97.25, 97.6, 97.7, 98.1, 98.4, 98.5, 99.2, 100.3' - Fracture or mechanical break (10), 40 deg and 45 deg, rough, undulating, healed  100.3-100.5' - Fracture zone (>10), 45 deg, rough, undulating, 2" diameter gravel fragments		Limestone  95.5-95.9' - light olive gray, (5Y 5/2), very fine to medium grained, moderate HCl reaction, very weak  (R1), trace organics 95.9-100.3' - pale yellowish brown, (10YR 6/2), fine grained, moderate  HCl reaction, weak (R2), small (1/16") voids cover 15% of the surface, large voids (3/16") cover less than 5% of the surface, trace organics	SC-1 collected at 95.9- 96.7' SC-2 collected at 99.1- 100.3' R4: 11 minutes



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33884.FL

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, NQ tools, HW casing

CORING	METHOD AL	ND E	JUIPIV	IENT: CME 55 S/N 252345, mud rotary, NQ tools, HW c	asıng		ORIENTATION : Vertical
WATER	LEVELS: 1.6	1 ft b	gs on	6/14/07 START : 4/10/2007 END : 4/	18/20	07 LOGGER : R. Bitely, K. Coke, A.	Erickson, W. Elliott
>00	(9			DISCONTINUITIES	υ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - 105 -62.4 -	R5-NQ 5 ft 64% 105.5 R6-NQ 5 ft 85%	75	6 >10 NR >10 1 3 0	101.5-101.7, 102.2- 102.6, 102.7- 103.0, 103.4-103.7' - Fracture (>10), rough, undulating, gravel fragments with <1" in size, angular 101.5, 101.7, 101.9, 102.3, 103.0, 103.4' - Fracture or mechanical break (6), rough, undulating, open (3/4")  106.6, 107.1' - Mechanical break, tight  107.4-107.6' - Fracture (4), horizontal, rough, undulating, small (1/2") fragments 108.0' - Fracture (2), 50 deg and 50 deg, rough, undulating, tight to open up to 3/16"		Limestone  - 100.3-100.5' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak (R1), trace organics, trace silt 100.5-103.7' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), zone of breccia fragments pale yellowish brown ([10YR 6/2], weak [R2], moderate HCl reaction) within 10YR 5/4 matrix from 100.5-101.4', trace organics, small (<1/16") voids cover 15-25%, few large (3/16") voids, weak zone (R1) at 102.6-102.7'  No Recovery 103.7-105.5' Limestone  - 105.5-109.8' - pale yellowish brown to moderate yellowish brown, (10YR 6/2, 10YR 5/4), fine grained, moderate HCl reaction, weak (R2), trace organics, small voids (<1/16") cover 25% of the surface, larger	R5: 8 minutes  SC-3 collected at 108.3-109.8'
110 -67.4	110.5		NR	- -		voids (3/8"x3/4") cover 10% of the surface fossiliferous (molds and casts), trace organics	R6: 10 minutes
     115 -72.4	R7-NQ 5 ft 76%	38	>10 >5 1 2 NR	110.7-110.9, 111.4-111.7' - Fracture zone, horizontal and vertical, rough, undulating, 3/8" and larger size rock fragments 111.1' - Fracture, 60 deg, rough, undulating, tight to open up to 1/16" 111.2' - Fracture, horizontal, smooth, undulating, open 112.0' - Fracture, 70 deg, rough, undulating, intersecting, one is tight and other is open up to 1/16" 112.4' - Fracture, horizontal, rough and undulating on one face, smooth and undulating on the other, open 113.4' - Fracture, 65 deg, rough, undulating,		No Recovery 109.8-110.5' Limestone  110.5-112.4' - moderate yellowish brown, (10YR 6/4), very fine to fine grained, moderate HCl reaction, very weak to weak (R1 to R2), 1/16" voids cover 20-30% of the surface, larger voids (3/16") cover less than 5%, fossil molds and casts  112.4-114.3' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak (R1), small voids (1/16") cover 35% of the surface up to 3/16" size voids cover about 5% of the surface	Driller's Remark: Water loss at 113.0'
- - - - - 120 -77.4	R8-NQ 5 ft 68%	64	0 2 1 0 NR	open up to 1/16" 114.0, 114.1' - Fracture, horizontal, rough, undulating, open, possible bedding plane  117.2, 117.4' - Fracture zone (>2), rough, undulating, up to 1/2" gravel-sized fragments, angular 118.1' - Fracture, horizontal, rough, undulating, tight to open up to 3/16"		No Recovery 114.3-115.5' Limestone  115.5-118.9 - moderate yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), very fine to fine grained, moderate HCl reaction, very weak to weak (R1 to R2), 3/16" sized voids cover 20-30% of the surface area, fossil molds cast up to 3/16" cover 5% of the surface area, some mottling with grayish orange (10YR 7/4) below 117.0' No Recovery 118.9-120.5'	R8: 6 minutes
			2	120.8, 121.0, 121.6, 121.9, 122.0, 122.3' - Mechanical break (6), rough, undulating	H	-	



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, NQ tools, HW casing

WATER	LEVELS : 1.6	1 ft b	gs on (	6/14/07 START : 4/10/2007 END : 4/	18/20	D7 LOGGER : R. Bitely, K. Coke, A.	Erickson, W. Elliott
≥ ∩ ⊕	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-	R9-NQ 5 ft	24	4	120.8-120.9' - Fracture zone, rough, undulating, gravel-sized fragments <1/4" diameter, angular, no openings >1/4" 121.9, 122.0' - fit tightly with opening up to 1/16"		Limestone 120.5-121.0' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), small voids (1/16")	-
- - 125 -82.4	42%		NR			cover 15% of the surface 121.0-122.6' - light olive gray, (5Y 5/2), fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), small voids (1/16") cover — 10-25% of the surface, moderately fossiliferous with fossil casts and	- - R9: 5 minutes -
-	125.5		>10	125.5-126.4' - Fracture zone, horizontal and 70 deg, rough and smooth, undulating, rock fragments from 3/16"-1-1/2" in size, few		molds about 5% of the surface  No Recovery 122.6-125.5' Limestone  125.5-126.4' - yellowish gray, (5Y	- - -
-	R10-NQ		>3	fragment faces match together 126.8' - Fracture, 20 deg, rough, undulating, tight and open(1/8") 127.1-127.2' - Fracture, horizontal, rough,		7/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2), few small voids (1/16"), 3/4" thick of light olive gray 5Y 5/2	-   -
-	5 ft 70%	34	>5	undulating, open, some small (1/2") fragments 127.4' - Fracture, horizontal, smooth, planar and undulating, open 127.6' - Fracture, horizontal, rough,		ilimestone ( slow HCI, medium strong [R3]) is present (interval unknown due to fractured nature of the interval)	Driller's Remark: Hard material at 128.0' -
130 -87.4	130.5		NR	undulating, tight with some openings up to 1/16"  128' - Fracture, horizontal, rough, undulating, tight with some openings up to 1/16"		126.4-129.0' - light olive gray and grayish orange, (5Y 5/2 and 10YR 7/4), mottled, fine grained, mild HCl reaction, weak to moderately strong	R10: 8 minutes
- - - - - - 135 -92.4	R11-NQ 5 ft 8%	7	1 NR	128.7-129.0' - Fracture zone, horizontal, rough and smooth, undulating to planar, fragment faces do not fit together 130.55' - Fracture, horizontal, rough, undulating, open		(R2 to ), moderately fossiliferous, few small voids (1/16") cover about 20%  of the area, large voids and fossil molds/casts up to 3/8"x9/16" cover 5% at 127.2-127.4' is a zone of light olive grey (5Y 5/2) limestone, slow HCI reaction, medium strong to strong (R3 to R4), no small voids as fossil molds/casts, another 1" thick zone is present at about 129.0'  No Recovery 129.0-130.5'  Limestone  130.5-131.0' - pale yellowish brown	Driller's Remark: Soft material throughout the run - R11: 1 minutes
-92.4       	135.5		7	135.55' - Fracture, horizontal, smooth, planar and undulating, open 135.65, 135.75, 136.3, 136.35' - Fracture,		and grayish orange, (10YR 6/2 and 10YR 7/4), mottled, fine grained, moderate to strong HCI reaction, very weak (R1), small voids (1/16") cover about 10%, 3/16" size cavities	-
	R12-NQ 5 ft 22%	0	NR >10	horizontal, smooth, planar, tight to open up to 1/8", appear to be bedding plane 135.7-136.1' - Bedding plane 136.0, 136.2' - Fracture, horizontal, smooth, planar and undulating, open 136.1-136.7' - rock fragments 136.5' - Fracture, horizontal, smooth, planar and undulating, open		No Recovery 131.0-135.5'  Limestone  135.5-136.0' - yellowish gray and grayish orange, (5Y 7/2 and 10YR 7/4), mottled, fine grained, mild HCl reaction, strong (R4), some thinly laminated bedding at 135.5-135.7', bedding angle 0-5 deg  136.0-136.2' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, extremely weak (R0), very fossiliferous	R12: 4 minutes



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

00111110		10 L	X O	TENT : CIVIE 33 3/N 232343, Mud Totally, NQ tools, HW C	aonig		ORIENTATION : Vertical
WATER	LEVELS: 1.6	31 ft b	gs on	6/14/07 START : 4/10/2007 END : 4/	18/20	D7 LOGGER: R. Bitely, K. Coke, A.	Erickson, W. Elliott
	(			DISCONTINUITIES	<b>(D</b>	LITHOLOGY	COMMENTS
ĕ₽£	<u>@</u> (%)		رم	DESCRIPTION	SYMBOLIC LOG		
D'II E	₹ĄŽ		流	DESCRIPTION	J	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
# SE	목 두 음	(%) Q	28	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	9	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
ER₩	2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Oρ	AC.	PLANARITY, INFILLING MATERIAL AND	Æ	AND ROCK MASS	SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SY	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				141.3-142.0' - Fracture zone, horizontal and	┿	Limestone	
_			>10	vertical, rough and smooth, undulating,		- 136.2-136.6' - Same as 135.5-136.0'	
				numerous fragments from 3/16"-2" in size		except thinly laminated bedding,	
_	R13-NC		2	142.4-142.7' - Fracture, horizontal and 60	1—	bedding angle about 5 deg	1
-	5 ft	12		deg, rough, undulating, open, both fractures	╀╌	<ul> <li>No Recovery 136.6-140.5</li> </ul>	Driller's Remark: Become
	44%			have several small (about 3/16") fragments	ш	140.5-141.2 - dusky yellow, (5Y 6/4),	harder at 143.0'
						fine grained, moderate HCl reaction,	naidei at 145.0
_			NR		╨	- weak (R2), fossiliferous, small voids	1
_					╁┰	(1/16") cover about 25% of the	-
145						surface, large voids (up to — 3/16"x3/8") cover about 5% of the	R13: 11 minutes
-102.4	445.5			<del>-</del>	Ш	surface area	
-	145.5				╁	141.2-142.7' - yellowish gray, (5Y	Driller's Remark: Piece
_			>10	145.7' - Fracture, 10 deg, rough, undulating,	╨	- 7/2), fine grained, mild to moderate	stuck in core, pullout, clean -
			10	tight with some open up to 3/16"		HCl reaction, medium strong (R3),	and then run last 2.0'
-				146.0-146.4' - Fracture zone, rough and	1	small voids (<1/16") cover 10% of	_
-			5	smooth, undulating, Numerous small	$\vdash$	the surface area, large voids	-
				fragments 3/16"-1"	$\perp$	(3/16"x3/4") cover about 5%,	
1 7	R14-NC			146.4-147.0' - Fracture, 80 deg, smooth, undulating, tight		fossiliferous	1
-	5 ft	20	>10	146.7' - Fracture, 5 deg, smooth, undulating,	╨	No Recovery 142.7-145.5'	1
_	80%			tight, appears to be along bedding plane	╆┯	Limestone 145.5-146.2' - Same as 141.2-142.7'	_
				147' - Fracture, 10 deg, rough, undulating,	<b> </b>	146.2-148.6' - yellowish gray to	
-			2	open, few fragments		grayish orange, (5Y 7/2 to 10YR 7/4),	1
-				147.1' - Fracture or mechanical break, 45	╁	fine grained, moderate HCl reaction,	D44: 22 minutes
150			NR	deg, rough, undulating, open	╨	medium strong (R3), thinly laminated	R14: 22 minutes
-107.4	150.5		INIX	147.4-148.2' - Fracture zone, horizontal and	Н	bedding from 146.4-147.0' and	
_	100.0			70 deg, rough, undulating, several fragments	L	148.2-148.6', trace voids (1/16")	1
_			>10	1"-3" in size, undulating, many fragments fit	₩	_ 148.6-149.5' - light olive gray, (5Y	-
				together, fragments at 148.0' shows coring marks in 2 directions	Н	5/2), fine grained, mild HCl reaction,	
				148.2' - Fracture, horizontal, smooth, planar,		<ul> <li>medium strong to strong (R3 to R4), very fossiliferous (mold and casts),</li> </ul>	1
-			>10	open	╨	less than 1/16" size voids cover	1
_				148.7' - Fracture or mechanical break, 10	╆┯	about 25% of the surface area. voids	_
	R15-NC			deg, rough, undulating, tight to open up to		and fossil molds (up to 3/8"x3/4")	
	5 ft 66%	16	6	3/8"		cover 15% of the surface area, trace	1
-	00%		2	149.5-149.7' - Fracture, 65 deg, rough,	╁	- organics	-
			<u> </u>	undulating, tight to open up to 3/8"	╨	No Recovery 149.5-150.5'	]
				149.7' - Fracture, horizontal, rough,	Ш	Limestone	
1 455			NR	undulating, open up to 3/8" 150.0-151.2' - Fracture zone, rough,	亡	- 150.5-151.7' - dusky yellow, (5Y 6/4),	R15: 8 minutes
155 <u> </u>				undulating, some dark staining, gravel-sized	+	fine grained, moderate HCl reaction, very weak to weak (R1 to R2), small	_
-112.4	155.5			fragments	$\vdash$	very weak to weak (RT to R2), small voids (up to 1/16") cover about 15%	
1 7				151.2-151.4' - Fracture (2), vertical and 70	L	surface, few large voids	1
-			2	deg, rough, undulating, dark, tight to open up	仜	151.7-153.8' - yellowish gray, (5Y	-
-				to 3/16",10% stain coverage on both surface	╁	<ul> <li>7/2), fine grained, mild HCl reaction,</li> </ul>	-
				151.5-151.9' - Fracture zone, horizontal and	$\vdash$	strong (R4), fossiliferous, 2-13/32	
			4	60 deg, rough, undulating, several fragments	T	zone of light olive gray (5Y 5/2)	1
-	D46 NO		1	up to 1-1/2", few pieces fit together	+	mottling at about 151.5', small voids	-
	R16-NG 5 ft	30	-'-	152.3, 152.4, 152.6, 152.9' - Fracture (4), 40 deg and 50 deg, rough, undulating, fracture in	╨	(<1/16") cover 5% of surface, few	]
	46%	50		alternating direction, tight, some open up to	$\vdash$	larger voids (fossil molds)	
-				3/16"	亡	No Recovery 153.8-155.5'     Limestone	1
-			ND.	152.6-152.9' - Fracture, 70 deg, rough,	$\perp \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \!$	155.5-155.6' - dark yellowish brown,	-
			NR	undulating, tight to open up to 1/16"	$\vdash$	_ (10YR 4/2), fine grained, strong to	
160				153.2' - Fracture, 55 deg, rough, undulating,	┰	moderate HCl reaction, very weak	R16: 5 minutes
-117.4				dark, tight, 10% dark staining -	世	(R1), laminated bedding, trace voids	-
	160.5			153.3, 153.4' - Fracture (2), horizontal,	+	_ (<1/16")	<b>-</b>
			ارا	smooth, undulating, open	$\vdash$		SC-4 collected at 160.5-
			1	153.4-153.55' - Fracture zone	1	F	161.4'
-			$\vdash$		-	_	-
					1		
1		1			1		ī



PROJECT NUMBER:

33884.FL BORING NUMBER:

E-05 SHEET 10 OF 11

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

				IENT : CIVIE 33 3/IN 232345, ITINU TOTALLY, INQ TOTALS, FIVE C			ORIENTATION : Vertical
WATER	LEVELS : 1.6	1 ft b	gs on (		18/20		
≥∪ <i>⊋</i>	<u>(</u> %			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A B B C C C C C C C C C C C C C C C C C	S F F	(%)	TUR 00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	٦ž	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FPT.	NG:	Ω	RAC:	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SE	SHR	ď	FF	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	5.10. 6, 120. 1200216, 2.0.
			6	153.7, 153.75' - Fracture (2), horizontal,	Ш	Limestone	
_				smooth and undulating, rough and undulating, moderately tight	$\top$	<ul> <li>155.6-156.7' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction,</li> </ul>	1 1
_	R17-NQ			155.6' - Fracture, rough, planar, open	$\vdash$	medium strong to strong (R3 to R4),	1 1
-	5 ft	28		155.7-156.2' - Fracture, 70 deg, rough,	╀	<ul><li>small voids (&lt;1/16") cover about 15%</li></ul>	1 -
_	32%			undulating, tight and open (1/16") 156.7, 156.8' - Fracture, horizontal, rough,	$\perp$	surface, moderately fossiliferous, few 3/16" fossil molds and casts	-
_			NR	planar, open	上	- 156.7-157.8' - dusky yellow, (5Y 6/4),	
				157.2' - Fracture, 20 deg, rough, undulating,	$\bot$	fine grained, mild to moderate HCI	
165				tight		reaction, very weak (R1), becoming	R17: 4 minutes
-122.4	165.5			157.4' - Fracture, 50 deg, rough, undulating, — tight	$\perp$	weak to moderately strong (R2 to R3) by 157.6', laminated bedding	
_	100.0			157.6' - Fracture, 30 deg, rough, undulating,	T	156.7-157.2', moderately	1
-			7	tight	+	fossiliferous, small voids (<1/16")	-
-				161.4' - Bedding plane, smooth, planar 161.8-162.1' - Bedding plane, horizontal,	Ł	cover about 5% surface area, few large voids	1 -
_			4	smooth, planar, open	$\bot$	No Recovery 157.8-160.5'	1 -
_				165.5-165.9, 166.6' - Bedding plane (3),		Limestone	_
	R18-NQ			smooth, planar 166.2' - Fracture, horizontal, rough,	H	160.5-162.1' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), fine	
	5 ft 64%	17	4	undulating, open	世	grained, moderate HCl reaction,	1
_				166.4' - Fracture, horizontal, rough,	ш	medium strong (R3), small voids	1 1
-				undulating, open 166.7' - Fracture, 5 deg, smooth, undulating,		L (<12/16") cover 15% of the surface area, few large voids (3/16")	1
_			NR	open	+	No Recovery 162.1-165.5'	R18: 12 minutes
170 <u>-</u> -127.4				167.1' - Fracture, 5 deg, rough, undulating,		Limestone	10. 12 minutes
-127.4	170.5			tight with open up to 3/16" 167.4, 167.9' - Fracture (2), horizontal, rough,	₩	165.5-166.3' - Same as 160.5-162.1' 166.3-167.2' - moderate olive brown,	1
			4	undulating, open		(5Y 4/4), fine grained, mild HCl	
			7	167.7' - Fracture, 30 deg, rough, undulating,	$\vdash$	reaction, medium strong (R3), small	
				tight with open up to 1/16" 168.1, 168.7' - Fracture (2), horizontal, rough,	Ľ	voids (<1/16") cover 50% of the surface area, few larger voids	1 1
_			4	undulating, open	╨	(3/16"), moderately fossiliferous,	1 1
-	R19-NQ			170.5-170.8' - Fracture, 80 deg, closed		- fragments of gray limestone (up to	1 1
-	5 ft	45	>10	170.8, 171.2, 172.0, 172.2' - Fracture (4), horizontal, rough, undulating	+	3/8") inclusion from 167.0-167.2' 167.2-168.7' - yellowish gray, (5Y	1 -
_	84%			170.8-171.2' - Fracture, 80 deg, open up to	Ė	- 7/2), mild to moderate HCl reaction,	1 -
_			>10	3/16"	₽	medium strong (R3), laminated	_
				171.7' - Fracture, horizontal and 40 deg, rough, undulating, dark	ш	bedding 168.0-168.2', small voids - (1/16") cover 5% of the surface area	
175			$\left( igcep$	172.5' - Fracture, 50 deg, dark gray, tight with	Н	No Recovery 168.7-170.5'	R19: 13 minutes
-132.4	175.5		NR	open up to 3/16"	L	Limestone	
-				172.7' - Fracture, horizontal, smooth, undulating, open	╁	- 170.5-174.7' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2),	1
-			>10	173.0-173.8' - Fracture zone, horizontal and	圧	mild to moderate HCl reaction,	1
_			1	vertical, rough, undulating, dark, many	世	- strong (R4), voids (up to 1/16") cover	-
-			4	3/16"-2" size fragments, some faces are smooth and planar	$\vdash$	10% surface area, zone of increased small voids (20%) from 173.4-173.6',	-
_				174.0, 174.1, 174.2' - Fracture (3), 5 deg,	世	<ul><li>fewer larger voids (3/16")</li></ul>	-
	R20-NQ 5 ft	7		rough, undulating, open	$oldsymbol{\perp}$	No Recovery 174.7-175.5'	]
	30%	'		174.4' - Fracture, 60 deg, smooth, undulating, tight		Limestone 175.5-177.0' - Same as 170.5-174.7'	1
]			NR	175.8, 175.9' - Fracture or mechanical break,	$\vdash$	except increased amount of voids	1
-				20 deg and 30 deg, rough, undulating, tight	世	(30%) from 175.9 to 176.5'	1
400				175.8-176.0' - Fracture, vertical, rough, undulating, open	H	No Recovery 177.0-180.5'	R20: 6 minutes
180 <u>-</u> -137.4				176.1-176.3' - Fracture zone, rough,	世	<b>—</b>	
	180.5			undulating, several 1" size fragments, no	+	-	-
_			5	identifiable fracture angle 176.3, 176.4, 176.5, 176.55, 176.65' -		- -	]
				Fracture, horizontal, rough, undulating, open	$\vdash$		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-05	SHEET	11	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722853.5 N, 457850.2 E (NAD83)

ELEVATION: 42.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 1.6	61 ft b	gs on (	6/14/07 START : 4/10/2007 END : 4/	18/20	07	LOGGER : R. Bitely, K. Coke, A.	Erickson, W. Elliott
				DISCONTINUITIES		Ĺ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES -	DESCRIPTION	SYMBOLIC LOG	Γ	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACINO
A TIO	TH, /	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,			MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
LEV.	ORE ECO	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB		AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ООШ	075	α.	ΨД	176.7, 177.0' - Fracture, horizontal, smooth,	S	┡	Limestone	
-			0	planar, open	Ħ	₽	180.5-180.8' - moderate yellowish	SC-5 collected at 181.7- 183.4'
-	R21-NC			180.6, 180.7, 180.8, 180.9, 181.5, 181.6, 181.7" - Fracture (7), horizontal, smooth,	世	╞	brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2),	-
-	5 ft	45	0	planar to undulating, openings ranging from	₽	╁	thinly laminated bedding, few small	-
-	72%		. 40	1/16"-3/8", no faces match to other 181.4' - Fracture, horizontal, smooth,	₽	ŀ	voids (<1/16") 180.8-181.7' - moderate yellowish	-
-			>10	undulating, open	₽	╊	brown, (10YR 5/4), fine grained,	-
105			NR	183.4' - Fracture, horizontal, rough, undulating, open	扛	┞	moderate to strong HCl reaction, very weak (R1), thinly laminated	R21: 9 minutes
185 <u>-</u> -142.4	405.5		INIX	183.7-184.1' - Fracture zone, horizontal and — vertical, rough and undulating, smooth and	世	┢	bedding (10 deg angle), zone of olive gray (5Y 3/2) lamination about	_
-	185.5			planar, 1/2"-1- 1/2" size rock fragments	-	h	1/16"-3/16" thick with 1/2" spacing	_
-					1		from 181.3-183.6' 183.4-183.7' - yellowish gray, (5Y	-
1 -					1		7/2), fine grained, mild to moderate	-
-					1		HCl reaction, medium strong (R3), fragments (3/16"x3/8") of gray	-
1 -					1		limestone present in the yellowish gray matrix, up to 1/16" voids cover	· -
-							about 15% of the surface area, up to	-
-					1		3/16" voids cover 5% of the surface area	
							183.7-184.1' - light olive gray and	
				_			grayish orange, (5Y 5/2 and 10YR 7/4), fine grained, mild HCl reaction,	
l _						L	medium strong (R3), thinly laminated, few small voids (1/16")	_
_					1	L	No Recovery 184.1-185.5'	_
-					1	L	Bottom of Boring at 185.5 ft bgs on 4/18/2007	_
-					1	L	4/10/2007	_
-					-	L		_
-					-	F		-
-						F		-
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PROJECT NUMBER:	BORING NUMBER:					
338884 FI	F-06	SHEET	1	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS	: 5.5 ft bo	gs on 5/02	2/07	START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump
				STANDARD	SOIL DESCRIPTION COMMENTS
LOW AND N (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
42.8	0.0			(1.1)	Poorly Graded Sand With Silt (SP-SM)
-	1	1.1	SS-1	1-1-2 (3)	0.0-1.1' - brownish black, (5YR 2/1), moist, very loose, very fine to fine grained, color grades to light gray
	1.5			(0)	(N7) below 0.6', 6% nonplastic fines, organics /
					decreasing with depth, sinca sand
_					<b></b>
_					<b>-                                    </b>
-					<b>-                                     </b>
-					<b>- 1</b>
5	5.0				- I
37.8	5.0				Sandy Fat Clay (CH)
-		1.0	SS-2	1-3-4 (7)	5.0-6.0' - very light gray, (N8), moist, medium stiff, high plasticity, no dilatancy, with iron oxide staining
	6.5			(1)	(5.0-5.3'), 25-30% very fine grained, trace organic particles, silica sand
					particles, sinca sariu
_					<b></b>
-					-
-	-				-
-					- I
10	10.0				<b>- 1</b>
32.8	10.0				Sandy Lean Clay (CL)
		1.5	SS-3	1-2-3 (5)	10.0-11.5' - Same as 5.0-6.0' except thin light gray, (N7), medium plasticity, 41% fine sand, sandy seams
_	11.5			. ,	
-					-
-					-
-					- I
-	1				<b>-</b>
-	1				1
15	15.0				1_1
27.8	_			1-4-7	Sandy Fat Clay (CH)  15.0-15.2' - Same as 5.0-6.0'  First reaction to HCI
-	-	1.1	SS-4	(11)	Silt (ML)
-	16.5				15.2-16.1' - grayish orange, (10YR 7/4), moist, soft, nonplastic, very rapid dilatancy, mild to moderate HCl
-	-				\reaction, 5% very fine sand-sized, carbonate material / _
-	1				
-	1				1
					]
-	-				] ]
20_					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-06	SHEET	2	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 2-15/16" tri-cone bit

						END: 5/4/2007			ORIENTATION : VEItical
VVAIER	LEVELS	Od n c.c .	jo UII 5/UZ		START : 5/2/2007	END : 5/4/2007 SOIL DESCRIPTION	LOGGEF	U.	Sump COMMENTS
<u>≥</u> 9€	SVMDLE	INTERVA	I (ft)	STANDARD PENETRATION		JOIL DEGUNII HON		90.	OliviiviLivio
ON C	SAMPLE			TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBOL	, COLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
A THE		RECOVE				E CONTENT, RELATIVE DE NCY, SOIL STRUCTURE, MII		IBOI	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTEN	NCT, SOIL STRUCTURE, IVIII	NERALOGI	SYN	INSTRUMENTATION
22.8	20.0			, ,	Clayey Sand (	(SC)			
-		1.3	SS-5	3-4-5	20.0-21.3' - ye	ellowish gray, (5Y 8/1), moi e to fine grained, no HCl re	st to wet,		1
-	21.5			(9)		th plastic fines, silica sand	action, 1070 _		1
-	21.5						-	1	-
-							-	1	-
-							-	1	1
-							-	1	-
-							-	1	-
-							-	1	-
	25.0						-	l	-
25 17.8	25.0				→ Clayey Sand (	(SC)		///	-
-		1.3	SS-6	8-20-49	\ 25.0-25.2' - Sa	amé as 20.0-21.3' except d	lark yellowish /-		-
-		1.5	00-0	(69)	brown, (10YR	th Limestone (SM)			-
-	26.5				25.2-26.3' - gra	ayish orange to dark yellov			-
-					(10YR 7/4 to 1	10YR 6/6), moist to wet, ve lerate HCl reaction, 15-20%	ry dense, low   _ % low plastic		-
-					fines, fine grav	vel-sized limestone, fine to	coarse -		-
-					sand-sized, ca	arbonate materials			-
-							-	l	-
-							-		-
-							-	1	-
30 <u> </u>	30.0				Silty Sand Wit	th Limestone (SM)			-
-		1.5	SS-7	31-31-55	30.0-31.1' - Sa	ame as 25.2-26.3'	-		-
-	24.5	1.0	00 7	(86)	Silt (ML)				-
-	31.5				↑ 31.1-31.5' - ligl	ht brown, (5YR 6/4), moist	, hard, low	₩	-
-					\ plasticity, rapid	d dilatancy, mild HCl reacti d, carbonate material	on, trace very / -	1	-
-					(iii o dana dizet	a, carbonato material		1	-
-							-		-
-							-		-
-							-		-
	05.0						-		-
35 7.8	35.0				Silty Sand (SN	M)			-
-		1.3	SS-8	39-47-45	35.0-36.3' - da	ark yellowish brown, (10YR	4/2), moist,		-
-		1.3	33-0	(92)	very dense, fin	ne to coarse grained, mild to 30% nonplastic fines, trace	to moderate to 10% fine		-
-	36.5					mestone, carbonate mater			-
-							-		-
-							-		-
-							-		-
-							-		-
-							-		-
-							-		-
40								$\vdash$	
	L								



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-06	SHEET	3	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

						ary, auto nammer, AVVJ rous,				_
WATER	LEVELS	. 5.5 π છ	gs on 5/02		START : 5/2/2007	END : 5/4/2007 SOIL DESCRIPTION	LUGGE	T	: C. Sump COMMENTS	_
≩Q₽	0445: -	INTERNI	1 (6)	STANDARD PENETRATION		SOIL DESCRIPTION		<u>ا</u>	O CONIVIENTS	_
ELO ON (	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAN	ME, USCS GROUP SYMBOL	. COLOR.	<u>-</u>	DEPTH OF CASING, DRILLING RATE,	
H B		RECOVE			MOISTUR	RE CONTENT, RELATIVE DE	NSITY OR	Š	DRILLING FLUID LOSS, TESTS, AND	
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTER	NCY, SOIL STRUCTURE, MI	NERALOGY	X	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
2.8	40.0 40.6	0.6	SS-9	56-50/1	Sandy Silt (M	IL)		П		_
-	40.6	0.0	000	(106/7")	40.0-40.6' - gr	rayish orange to pale yellov 10YR 6/2), mottled, moist, l	vish brown,	₩		-
-	1				coarse graine	d, nonplastic, rapid dilatan	cy, mild to	1		-
-	1				moderate HCI	I reaction, 38% fine to coar ace fine gravel-sized, carbo	se .	ł		-
-	-				material	ace line gravei-sized, carbo	onate .	┨		-
-								ł		-
-	-							ł		-
-	-						-	1		-
-								1		-
								ł		-
45 <u> </u>	45.0			26 50/4	Sandy Silt (M	II \		╁	<del>,,,,</del>	
	45.8	0.3	SS-10	36-50/4 (86/10")	45.0-45.8' - Sa	ame as 40.0-40.6' except 1		$\  \ $		-
-	10.0				vertically exter 45.4-45.8'	nded black organic seam f	rom	ť		-
-					(40.4 40.0			┨		-
_								┨		_
_								ł		_
-								4		_
_								1		_
_								1		_
_								1		_
50	50.0							L		
-7.2 -				25-43-45	Sandy Silt (M 50.0-51.2' - ve	<b>IL)</b> ellowish gray, (5Y 7/2), moi	st. hard. fine	Ш		_
_		0.2	SS-11	(88)	to coarse grain	ined, nonplastic, rapid dilata	ancy, mild	4		_
_	51.5					33% fine to coarse sand-si carbonate material, trace o		ľ		_
_						•		1		_
_										_
_								1		_
l _								1		_
I -								1		_
_								1		_
55	55.0							<u> </u>		
-12.2		0.8	SS-12	43-50/4 (93/10")	Silt With Sand	<b>d (ML)</b> ame as 50.0-51.2' except g	rading to			_
_	55.8			(93/10 )	moderate brov	wn, (5YR 4/4), 10-15% san	d-sized and	Ш		_
_	[				\thin organic le	enses				_
					l					_
										_
										_
							•			_
60										_



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-06	SHEET	4	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 2-15/16" tri-cone bit

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

						ary, auto nammer, AVVJ rous,				ORIENTATION : VEItical
WATER	LEVELS	. σ.σ. π	us on 5/02		START : 5/2/2007	END : 5/4/2007 SOIL DESCRIPTION	LOGGI	<u> </u>	U.	Sump COMMENTS
≥⊕£1	04			STANDARD PENETRATION TEST RESULTS		SOIL DESCRIPTION		$\dashv$	ဗ္ဗ	COIVIIVIENTO
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		TEST RESULTS	SOII NAN	ME, USCS GROUP SYMBOL	COLOR		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H B		RECOVE			MOISTUR	RE CONTENT, RELATIVE DE	NSITY OR		BOL	DRILLING FLUID LOSS, TESTS, AND
LEV EPT			#TYPE	6"-6"-6"	CONSISTEN	NCY, SOIL STRUCTURE, MI	NERALOGY		₹	INSTRUMENTATION
<u>-17.2</u>	60.0	0.1	∖SS-13 /	(N) 50/1.5	☐ Limestone Fr	ranments		7	0)	
	00.0		(00 .0)	(50/1.5")	│ \ 60.0-60.1' - ve	ellowish grav. (5Y 7/2), fine	to coarse	/-		-
_					\grained, mild t	to moderate HCl reaction,	sand-sized	4		-
_					fragments			4		-
								4		_
								1		_
								1		_
								1		-
-								1		<del>-</del>
65	65.0							1		-
-22.2	65.0 65.2	0.2	SS-14	50/2.0	_ Limestone Fr	agments		$\neq$	Т	<del></del>
-				(50/2.0")	\65.0-65.2' - Sa	ame as 60.0-60.1'	/	/ 🕂		-
-					Begin Rock C	oring at 66.0 ft bgs		$\dashv$		-
-					See the next s	sheet for the rock core log		+		-
-								4		-
_								4		-
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70							_	╛		
-27.2								1		
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PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-06 SHEET 5 OF 11

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 5.5	ft bgs	s on 5/	/02/07 START : 5/2/2007 END : 5/4	4/2007	7 LOGGER : C. Sump	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
AND (f)	Ž AND 17 (%		ES	DESCRIPTION	) LO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
E PT	SORE	ROD	RAC ER I	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3 V ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	66.0	ш	ш.п.	66.0' - Fracture, horizontal, rough	0)	Limestone	Numerous low angle to
-			5	66.2' - Fracture, horizontal, rough 66.4' - Fracture, 45 deg, rough, semi planar	Н	<ul> <li>66.0-69.9' - pale yellowish brown,</li> <li>(10YR 6/2), fine to medium grained,</li> </ul>	vertical healed fractures -
-				66.6, 66.8, 67.3' - Fracture, 45 deg and 60	H	strong HCl reaction, weak (R2),	-
_			1	deg, non-planar -	Ħ	<ul> <li>dissolution along bedding plane lamination, spaced (1/16"-1/4"), voids</li> </ul>	-
	R1-NQ 5 ft	8	4	68.1-68.2' - sandy interbed	H	(1/16"-3/16") cover 10% surface	
	78%	0	4	68.1, 68.5, 68.8, 68.9' - Fracture (4), rough, undulating, irregular, non-planar	H		
_			>10	69.0-69.9 - Fracture zone (>10)	Ħ	_	_
70 <u> </u>				_	H	No Recovery 69.9-71.0'	R1: 5 minutes
-27.2			NR	-	H	-	R1.5 minutes
-	71.0			71.0-72.0' - Fracture zone, fragments	H	Limestone	-
-			>10	-	Ш	<ul> <li>71.0-72.3' - Same as 66.0-69.9' except very weak (R1), increasing</li> </ul>	0.5" organic seam -
-				72.0-73.0' - Fracture zone, fragments	Ш	percent small voids, friable	-
_			>10	-	Ш	- 72.3-75.6' - moderate yellowish brown, (10YR 5/4), very fine to fine	-
	R2-NQ 5 ft	23	1	73.1' - Fracture, vertical, rough, undulating	Ш	grained, very weak to weak (R1 to R2), finely laminated, trace	
_	72%	23	'	_	Ш	voids/cavities, dissolution texture	
_			7	74.1, 74.2, 74.4, 74.5, 74.6, 74.8, 74.8, 74.9' - Bedding plane or mechanical break (8), <5	Н	along the bedding plane (1/4" thick)	_
75 <u> </u>				deg, rough, planar, open <1/16"	Н		R2: 8 minutes
-52.2			2	75.1-75.2' - Fracture or mechanical break, 80 deg and vertical, rough, planar, tight	Н	N- D75 0 70 0	K2. 6 minutes
-	76.0		NR	-	H	No Recovery 75.6-76.0' Limestone	Intact core 19.2" (76.1-
-			0	-	Ш	<ul> <li>76.0-78.3' - grayish yellow to orangish gray, (5Y 8/4 to 10YR 7/4),</li> </ul>	77.7') break to reduce size - SC-1 collected at 76.1-
-				-	Ш	strong HCl reaction, weak (R2),	76.9'
_			>10		Ш	<ul> <li>voids (up to 1/16") cover 15-20% of the surface, cavities up to 3/4"</li> </ul>	-
	R3-NQ 5 ft	33	0		Ш	diameter (10-20 per foot), fossil molds and solution cavities, dark	
_	46%	33		_	Ш	brown /black staining on some larger	
-			ND	-	Ш	cavities, light to dark gray fine grained inclusions, rip up clasts	_
80 <u>-</u> -37.2			NR	_	ш	between 77.0-77.5', needle-like organic imprints on fracture surface,	R3: 4 minutes
-				-	Ш	<ul> <li>dark brown layering visible over 3/4"</li> </ul>	
-	81.0			- 81.1, 81.2, 81.4, 81.5' - Fracture or	Ш	zone No Recovery 78.3-81.0'	-
1 -			4	mechanical break (4), rough, irregular	Ш	<ul> <li>Limestone 81.0-84.0' - Same as 76.0-78.3'</li> </ul>	
1 -				- 82.1' - Fracture, rough, planar, dark	Ш	except strong HCl reaction, voids (1/16") and cavities cover 15-25% of	-
1 -			2	gray/black, possible organic pyrite 82.4' - Fracture, rough, undulating	Ш	the surface, fossiliferous with molds	1
1 -	R4-NQ 5 ft	37	>10	82.9-83.3' - Fracture zone, percent of large	Ы	and casts (lot more than molds)	]
-	60%	01	. 10	cavities (>1/2") increasing in this zone	$\square$	- No Bassassa 04 0 00 01	]
-				-	Н	No Recovery 84.0-86.0'	-
85 <u>-</u>			NR	_	A	<u></u>	R4: 4 minutes
				-	Ħ		-
-	86.0				Н		-



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 5.5	ft bgs	s on 5/	02/07 START : 5/2/2007 END : 5/4	1/2007	7 LOGGER : C. Sump	
>	(9)			DISCONTINUITIES	Ö	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 90 -47.2 -	R5-NQ 5 ft 26% 91.0	7	NR >10	89.9' - Discontinuity (sharp) between moderately dense limestone and limestone with large percent voids, possible missing material		No Recovery 86.0-89.7'  Limestone 89.7-89.9' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCI reaction, medium strong (R3), fossiliferous, voids (1/16"-1/8") cover 15-20% of the surface, trace oval cavities (up to 1/2") (possible fossil	Driller's Remark: 86.0-89.5' very soft; possible void, lost 20 % circulation, no recovery likely in this zone  R5: 3 minutes
95_ -52.2	R6-NQ 5 ft 70% 96.0	15	2 2 1 NR	89.9-91.0' - Fracture, rough, irregular fractures on 2-4" core pieces, 1"-2" zone of fragments 1/2"-1-1/2" in size (upper weathered/bleached) 91.0-91.2' - Fracture zone, 3/4"-1-3/45" size fragments 91.6' - Fracture or mechanical break, rough, undulating 91.7, 92.2' - Fracture, sharp contact between limestone and gravelly lean clay (CL) interbed 92.7' - Fracture, planar and stepped, parting surface on end of core piece, fine laminations 93.5' - silt interbed (nonplastic)		molds) molds and casts, black infilling in some voids, sharp contact with below 89.9-91.2' - yellowish gray to pale olive, (5Y 7/2 to 10 Y 6/2), medium strong (R3), fossiliferous, voids (1/4"-3/4" solution cavities) cover 25-30% of the surface, smaller fragments appear weathered or bleached possible void related, dark black (possible lignite) and light gray fine (silt sized) infilling in some voids 91.2-91.7' - Same as 89.9-91.2'	Clay interbed 91.7-92.2'  SC-2 collected at 92.6- 93.4'  R6: 8 minutes Steady drill rate across run
	R7-NQ 5 ft 14%	11	0 NR	93.9' - sharp contact with limestone 94.1' - Fracture or mechanical break, vertical, rough, undulating		except yellowish gray, (5Y 7/2), very fine to fine grained, 1/16"-1/8" voids cover the surface  Lean Clay (CL) 91.7-92.2' - yellowish gray, (5Y 7/2), medium plasticity, strong HCI reaction, few gravel-sized (1/4"-3/4") limestone fragments at 91.7-91.8', 25% fine silt 92.6-93.5' - yellowish gray, (5Y 7/2), strong HCI reaction, medium strong to strong (R3 to R4), fine grained silt Limestone 92.2-92.6' - yellowish gray, (5Y 7/2),	Driller's Remark: 100% loss of circulation at 97.0' below ground surface
_	101.0		NR	- - -		fine grained, weak (R2), finely laminated (1/10"-1/4")  Silt (ML) 93.5-93.9' - moderate yellowish	Driller's Remark: Possible void 100.0-102.0' Driller's Remark: Void at 100.0-102.0' based on barrel advancement ("fell"),
_			0	- -		brown, (10YR 5/4), nonplastic, few gravel-sized (1/16-3/16") limestone fragments (<10%)	setting temporary casing at 106.0'
- - 105 -62.2	R8-NQ 5 ft 20% 106.0	0	NR			Limestone 93.9-94.5' - moderate yellowish brown, (10YR 5/4), moderate HCI reaction, weak (R2), small voids cover 20-30% of surface No Recovery 94.5-96.0'	R8: 4 minutes



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 5.5	ft bg	s on 5/	02/07 START : 5/2/2007 END : 5/4	1/200	7 LOGGER : C. Sump	
<b>₹</b> □₽	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	RQ		THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS  Limestone	DROPS, TEST RESULTS, ETC.
_			1 >10	106.8-107.7' - Fracture zone, limestone fragments		<ul> <li>96.0-96.7' - pale yellowish brown,</li> <li>(10YR 6/2), strong HCl reaction, very weak (R1), fossiliferous, up to 1/16"</li> <li>voids cover 20-25% of surface,</li> </ul>	
-	R9-NQ 5 ft	39	>10	107.7-108.5' - Bedding plane, horizontal, smooth to slightly rough, planar, 1/2"-1" spacing		cavities/molds up to 1/2" cover 5-7%, easily broken by hand, punky texture No Recovery 96.7-102.0'	-
- - 110	84%		1	- 109.4, 110.0' - Fracture (2), horizontal, rough, undulating		Limestone Fragments 102.0-103.0' - Same as 96.0-96.7' except yellowish gray, (5Y 7/2), fine grained, moderate HCI reaction,	-
-67. <u>2</u>	111.0		1 NR	-		weak (R2), 1"-2" fragments, medium strong to strong, almost conchoidal fracture	R9: 5 minutes
- -			>10	111.0-112.0' - Bedding plane, <5 deg, rough, planar, 1/2"-2" spacing, open to 1/8" -		No Recovery 103.0-106.0' Limestone 106.0-110.2' - grayish orange, (10YR 7/4), strong HCl reaction, very weak	- Driller's Remark: 112.5-
-	R10-NQ		0	-	Щ	(R1), voids (1/16"-1/8") cover 10-15% of the surface, larger cavities/fossil molds (up to 1/2")	114.0' possible void –
- - 115 -72.2	5 ft 42%	0	NR	- - -		cover less than 5% (variably spaced) but in concentrated in zones, white chalky carbonate infilling in some cavities/molds, limestone 1-1/2" fragments from 107.0-107.7', 1/2"-1" horizontal partings (bedding plane)	- - R10: 2 minutes
_	116.0			- - 116.0-116.2' - Fracture zone, limestone	H	from 107.7-108.5'   No Recovery 110.2-111.0'	Easily broken by hand
_			2	fragments 116.2, 116.7, 117.1, 117.2, 117.6, 118.0, 118.5, 118.8, 119.2, 119.3' - Bedding plane	H	111.0-112.0' - Same as 106.0-110.2'   except 1/2"-2" horizontal partings   Silt (ML)   112.0-112.6' - grayish orange, (6YR	"rotten rock" -
_	R11-NQ 5 ft	70	3	(10), horizontal, rough, undulating - - -		7/4), nonplastic, strong HCl reaction  Limestone  - 112.6-113.1' - Same as 111.0-112.0'	
-	98%		2	-		No Recovery 113.1-116.0' Limestone 116.0-120.9' - very pale orange, (10YR 8/2), medium to coarse	-
120 <u>-</u> -77.2 -	121.0		2	119.7-119.9' - Fracture zone, limestone fragments 120.2' - Fracture (60), rough, semi planar		grained, strong HCl reaction, very weak to weak (R1 to R2), up to 1/16" size voids cover 25% of the surface,	R11: 4 minutes
_			NR) 4	120.9' - Bedding plane, horizontal, slightly rough, planar - 121.3, 121.7, 121.8' - Fracture (3), horizontal, rough, undulating -		1/4" cavities and fossil molds cover up to 5% surface No Recovery 120.9-121.0' Limestone	
-	R12-NQ		2	121.9' - Fracture, 30 deg, rough, undulating 122.2' - Fracture, 45 deg, rough, semi planar 122.6' - Fracture, 45 deg, rough, semi planar		121.0-126.0' - Same as 116.0-120.9' except slightly more competent, 123.5-126.0' zone of weak rock (R2)	-
-	5 ft 100%	60	0	-		-	-
125_ -82.2			2	124.4, 124.7, 125.3' - Fracture or bedding plane (3), horizontal, slightly rough, undulating, open to <1/8"		<del>-</del> 	R12: 4 minutes
_	126.0		<u>'</u>		H		



PROJECT NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER LEVELS: 5.5 ft bag on 5/02/07 START: 5/2/2007 END: 5/4/2007 LOGGER: C. Sump  DISCONTINUITIES  DISCONTINUITIES  DESCRIPTION  DESCRIPTION  DESCRIPTION  DEPTH. TYPE, ORIENTATION ROUGHNESS, PLANARITY, INFILLING MATERIAL AND PLANARITY, INFILLING MATERIAL, AND THORNESS, CAVING ROPE, TEST RESULTS, ET  THICKNESS, SURFACE STAINING, AND TIGHTNESS  127.6, 127.8' - Fracture (2), horizontal, rough, irregular  127.9 - Fracture, 60 deg, rough, semi planar, dark gray thin coating on surface (possible pyrite)  131.0  131.0  THICKNESS, 128.4' - Fracture (3), rough, undulating, dark gray coating, 1.3' length  131.0 - 131.3' - Fracture, limestone fragments  DESCRIPTION  DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND DEPTH OF CASIN FILLID LOSS, CORING RATE / SMOOTHNESS, CAVING RC PARACTERISTICS  FURTHERING, HARDNESS, AND ROCK MASS PLANARITY, INFILLING MATERIAL, AND PROPS, TEST RESULTS, ET  Limestone  126.0-130.4' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak (R1), small voids (1/16-1/8') cover variable percent of surface area, cavities up to 1/2' cover less than 5% of surface, easily broken by hand, for surface, easily broken by hand, for surface, easily broken by hand, for surface, easily broken by hand, for surface area, caving more parting and parting dark gray coating, 1.3' length  131.0  131.0  131.0  132.9' - Fracture, horizontal, smooth, limestone fragments  132.9' - Fracture, horizontal, smooth, limestone fragments  133.3-134.3' - pale olive gray to dusky yellow, (107 6/2 to 5% 6/4), fine grained, moderate HCl reaction, limestone fragmented fragments	E AND ROD
Limestone 126.0-130.4' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak (R1), small voids (1/16-1/8") cover variable percent of surface area, cavities up to 1/2" cover less than 5% of surface, easily broken by hand, fossil molds filled with white chalk carbonate material, at 129.9' abrupt color change to very light yellowish gray (5Y 8/1)  130 -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments  133.3-134.3' - pale olive gray to dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCl reaction, forsil molds filled with white chalk carbonate material, at 129.9' abrupt color change to very light yellowish gray (5Y 8/1)  R13: 5 minutes  R13: 5 minutes	E AND ROD
Limestone 126.0-130.4' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak (R1), small voids (1/16-1/8") cover variable percent of surface area, cavities up to 1/2" cover less than 5% of surface, easily broken by hand, fossil molds filled with white chalk carbonate material, at 129.9' abrupt color change to very light yellowish gray (5Y 8/1)  130 -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments  133.3-134.3' - pale olive gray to dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCl reaction, forsil molds filled with white chalk carbonate material, at 129.9' abrupt color change to very light yellowish gray (5Y 8/1)  R13: 5 minutes  R13: 5 minutes	E AND ROD
Limestone 126.5' - Fracture, 45 deg, rough, undulating, non planar, irregular  127.6, 127.8' - Fracture (2), horizontal, rough, irregular  127.6, 127.8' - Fracture, 60 deg, rough, semi planar, dark gray thin coating on surface (possible pyrite)  130 -87.2  131.0  R13-NQ 5 ft   45   3	
Limestone 126.0-130.4' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak (R1), small voids (1/16-1/8") cover variable percent of surface area, cavities up to 1/2" cover less than 5% of surface, easily broken by hand, fossil molds filled with white chalk carbonate material, at 129.9' abrupt color change to very light yellowish gray (5Y 8/1)  130 -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  131.0  R13-NQ -87.2  132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments  133.3-134.3' - pale olive gray to dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCl reaction, forsil molds filled with white chalk carbonate material, at 129.9' abrupt color change to very light yellowish gray (5Y 8/1)  R13: 5 minutes  R13: 5 minutes	-
Table 1	-
R13-NQ 5 ft 33 -87.2	
R13-NQ 5 ft 88% 45 3 3 irregular 127.6, 127.8' - Fracture (2), horizontal, rough, irregular 127.9' - Fracture, 60 deg, rough, semi planar, dark gray thin coating on surface (possible pyrite) 128.1, 128.3, 128.4' - Fracture (3), rough, undulating, semi planar parting 129.0-130.0' - Fractures, vertical, undulating, dark gray coating, 1.3' length No Recovery 130.4-131.0'  R13-NQ 5 ft 88% 45 3 irregular 127.9' - Fracture, 60 deg, rough, semi planar, dark gray thin coating on surface (possible pyrite) 128.1, 128.3, 128.4' - Fracture (3), rough, undulating, semi planar parting 129.0-130.0' - Fractures, vertical, undulating, dark gray coating, 1.3' length No Recovery 130.4-131.0'  Limestone 131.0-133.3' - Same as 126.0-130.4'  R13-NQ 5 ft 132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments 133.3-134.3' - pale olive gray to dusk yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCl reaction.	
130	-
dark gray thin coating on surface (possible pyrite)  130 -87.2  130 -87.2  130 -87.2  131.0  R14-NQ - 5 ft 66%  33 - 810 - 86%  33 - 810 - 88%  dark gray thin coating on surface (possible pyrite) 128.1, 128.3, 128.4' - Fracture (3), rough, undulating, semi planar parting 129.0-130.0' - Fractures, vertical, undulating, dark gray coating, 1.3' length  No Recovery 130.4-131.0'  Limestone 131.0-131.3' - Same as 126.0-130.4'  132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments  133.3-134.3' - pale olive gray to dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCl reaction.	-
3 128.1, 128.3, 128.4' - Fracture (3), rough, undulating, semi planar parting 129.0-130.0' - Fractures, vertical, undulating, dark gray coating, 1.3' length  No Recovery 130.4-131.0'  Limestone 131.0-133.3' - Same as 126.0-130.4'    132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments    133.3-134.3' - pale olive gray to dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCl reaction.	-  
129.0-130.0' - Fractures, vertical, undulating, dark gray coating, 1.3' length  No Recovery 130.4-131.0'  No Recovery 130.4-131.0'  Limestone 131.0-133.3' - Same as 126.0-130.4'  132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments  133.3-134.3' - pale olive gray to dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCl reaction.	-
dark gray coating, 1.3' length  No Recovery 130.4-131.0'  131.0-131.3' - Fracture, limestone fragments  Limestone 131.0-133.3' - Same as 126.0-130.4'  132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments  133.3-134.3' - pale olive gray to dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCl reaction.	-
131.0-131.3' - Fracture, limestone fragments  >10  131.0-131.3' - Fracture, limestone fragments    Limestone   131.0-133.3' - Same as 126.0-130.4'	
R14-NQ 5 ft 66%  33   >10   132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments  1   1   1   1   1   1   1   1   1   1	-
R14-NQ 5 ft 66%  132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments  133.3-134.3' - pale olive gray to dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCI reaction.	-
R14-NQ 5 ft 66%  132.9' - Fracture, horizontal, smooth 133.2' - Fracture, horizontal, smooth, limestone fragments  133.3-134.3' - pale olive gray to dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCI reaction.	1
133.2' - Fracture, horizontal, smooth, limestone fragments  133.3-134.3' - pale olive gray to dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCl reaction.	1
dusky yellow, (10Y 6/2 to 5Y 6/4), fine grained, moderate HCl reaction.	]
0   Tine grained, moderate HCI reaction,	
weak to medium strong (R2 to R3),	4
135   trace fine lamination (<1/16")   No Recovery 134.3-136.0'   R14: 6 minutes	
1	
136.0   136.0' - Dark gray/black fine grained   Limestone	
>10 particulate staining/coating on some fracture - 136.0-138.0' - very light gray, (N8), priller's Remark: Void	-
136.4' - Fracture, <10 deg, rough, undulating, strong (R2 to R3), cavities lenticular	
>10 open   in shape up to 3/4", fossil casts and molds up to 1/2" (gastropod)	1
R15-NQ deg and 70 deg, rough, undulating, tight No Recovery 138.0-141.0'	1
40% deg, rough, undulating, tight	
137.2-137.4' - Fracture zone, no visible NR orientation, 1/2" width total core diameter	
140	
-97.2   R15: 5 minutes	4
141.0 Limestone	4
-   >10   141.35-141.7' - Fracture zone, fragments to - 141.0-143.6' - yellowish gray to olive	
2" angular to sub angular, fine black particles gray, (5Y 7/2 to 5Y 5/2), strong HCl on fracture faces (possibly pyrite or organics) reaction, medium strong (R3),	-
>10 141.7-142.3' - Fracture (3), 45 deg and 60 - variable zones of voids/cavities (up deg, rough, planar, healed to 1/2")	- 1
R16-NQ 141.8, 142.3' - Fracture (2), 50 deg, rough,	- 1
5 ft   15   >10   planar, open 1/8"   142.4, 142.55' - Mechanical break (2), <5   143.6-144.0' - moderate olive brown,	1
deg, rough, planar, open (5Y 4/4), strong HCl reaction, weak 142.55-143.8' - Fracture zone, 40 deg and 60 (R2), porous limestone, numerous	]
145 deg, fragments to 3" angular voids (1/16"-1/8") and cavities	
planar, open (1/4") redium coarse sand-sized particles	4
146.0 No Recovery 144.0-146.0'	



PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-06

SHEET 9 OF 11

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 5.5	ft bgs	s on 5/	02/07 START : 5/2/2007 END : 5/4	4/200	7 LOGGER : C. Sump	
≥∩ ∵	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A A CE	TH.,	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	٦ ا	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ORE	Ø	SAC ER F	PLANARITY, INFILLING MATERIAL AND	/MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	225	ď	##	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	
			>10	146.0-147.0' - Bedding plane, horizontal, planar, numerous partings spaced at	╙	Limestone - 146.0-147.0' - dark yellowish orange,	
			- 10	1/2"-1-1/2" apart		(10YR 8/6), coarse grained, strong	
			0	147.3' - Fracture, 60 deg, rough, undulating,		HCl reaction, weak (R2), friable disaggregates into medium	
			2	semi planar fracture	Ь	sand-sized particles, numerous small	1
-	R17-NQ			147.6' - Fracture, 30 deg, rough, semi planar	H	voids over 30% of surface	1
_	5 ft 74%	29	2	148.2' - Fracture, 10 deg, rough, planar 148.3' - Fracture, 50 deg, slightly rough, semi	H	<ul> <li>147.0-149.4' - medium gray to yellowish gray, (N5 to 5Y 7/2), very</li> </ul>	SC-4 collected at 148.3- 149.4'
-	, 0		3	planar	ш	fine to fine grained, mild HCl	1
150			3	149.4-149.7' - Bedding plane, horizontal,	仜	<ul> <li>reaction, medium strong (R3),</li> <li>1/16"-3/16" size voids concentrated</li> </ul>	1 1
-107.2			ND	planar	╁╌	in thin (<1/10") horizontal zones	R17: 7 minutes
-			NR	-	F	spaced at 6"-1.2' apart	1
-	151.0			-		149.4-149.7' - moderate yellow brown and yellowish gray, (10YR	
-			2	151.1' - Fracture, horizontal, rough, undulating	$\vdash$	_ 5/4), laminated, contorted wavy	-
_				151.3' - Fracture, vertical, rough, undulating -	$\Box$	bedding planes No Recovery 149.7-151.0'	
_			3	to non planar, 3" long 152.1' - Fracture or mechanical break, 60	t	_ Limestone	1
_				deg, rough, undulating	┢	151.0-155.5' - light olive gray to yellow gray, (5Y 5/2 to 5Y 7/2),	_
_	R18-NQ 5 ft	33	9	152.1, 152.5' - Fracture, horizontal, rough 153.0, 155.5' - Fractures (2), horizontal,		<ul> <li>moderate HCl reaction, very weak to</li> </ul>	1
	90%			rough, planar to undulating		weak (R1 to R2), sparse voids (1/16"-1/8"), and cavities (up to 1/2")	]
			4	_		above 152.5', percent of voids	
155			4			increase beyond 152.5', 25-30%	1
-112.2			3	_	Н	porous by volume, somewhat friable disaggregates into medium	R18: 5 minutes
	156.0		NR	-	H	sand-sized particles, voids/cavities	1
-				156.0-156.4' - Fracture zone, limestone	Ľ	oriented horizontally, cavities increase in size (up to 1-1/4") with	1
_			2	fragments 156.4, 156.7' - Bedding plane, horizontal,	╙	depth	1
_				smooth, planar	$\perp$	No Recovery 155.5-156.0' Limestone Fragments	1
_			1	157.5' - Fracture or mechanical break, 15	ш	156.0-156.4' - Same as 151.0-155.0'	Redox changes possibly
_	R19-NQ			deg, rough, undulating 157.7' - Fracture, sharp contact with grayish	$\vdash$	- except slough Limestone	Redux changes possibly
_	5 ft 60%	35	1	yellow limestone (surfaces do not match)	F	156.4-157.7' - very pale orange,	1 1
-	00%			158.9' - Fracture, horizontal, smooth, planar	岸	<ul> <li>(10YR 8/2), fine to medium grained,</li> </ul>	-
-				-	╀	strong HCl reaction, weak (R2), very small voids (1/16"), fossiliferous	-
160 <u> </u>			NR		$\Box$	— (1/16"-1/8")	R19: 7 minutes
_				-	仜	157.7-159.0' - yellowish gray to grayish yellow, mottled with light	-
-	161.0			-	╁	gray, (5Y 7/2 to 5Y 8/2 mottled with	-
-			4	161.3, 161.4, 161.5' - Bedding plane (3),	F	N7), very fine to medium grained, strong HCl reaction, medium strong	-
-				horizontal, smooth, planar 161.9' - Fracture, horizontal, rough, planar	片	(R3), sharp contact	-
			3	_	₽	No Recovery 159.0-161.0' Limestone	]
_				162.5-162.6' - Fracture zone, contact with olive brown limestone, limestone fragments -	П	161.0-162.4' - medium gray, (N 5),	Change in redox conditions
	R20-NQ 5 ft	0	>10	162.7' - Fracture or mechanical break,	厅	moderate HCl reaction, medium	
	88%		- 10	vertical 162.9' - Fracture, horizontal, rough, non -	$\vdash$	strong (R3), with thin yellowish gray lamination zones of small cavities	
				planar	Ľ	(<3/4"), 6"-8" spacing otherwise tight	]
165			>10	163.3, 163.4, 163.5, 163.6' - Fracture (4),	H	and dense, sharp contact	1
-122.2				horizontal, smooth, planar — 163.5-163.8' - Fracture zone, limestone	Ш		R20: 9 minutes
]	166.0		NR	fragments	Ш	Γ	1
	,				1		



PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-06

SHEET 10 OF 11

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 5.5	ft bg	s on 5/	02/07 START : 5/2/2007 END : 5/	4/200	LOGGER : C. Sump	
> □ ⊋	(%			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	: RU :TH, :VEF	R Q D (%)	TO-	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
URF	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ООШ	072	<u>~</u>	ΗΔ		S		
_			>10	164.2-165.4' - Fracture, <25 deg and >70 deg, non planar	H	Limestone - 162.4-163.4' - moderate olive brown,	-
_				166.0-166.5' - Fracture zone, limestone	₽	(5Y 4/4), medium strong to strong	1
_			>10	fragments 166.5' - Fracture or mechanical break,	Ш	(R3 to R4), voids (1/16-1/8") cover - 20-30% of surface, horizontally	_
_				horizontal, rough, undulating		oriented cavities (up to 1") in zones,	
	R21-NQ 5 ft	40	4	167.1-167.4' - Bedding plane, horizontal, smooth, 3/4" thick limestone fragments	┢┼	thin medium gray limestone fragments	
	88%	40	4	167.7' - Bedding plane, horizontal		163.4-163.6' - medium strong to	
			>10	168.4, 168.5' - Fracture (2), horizontal, rough 168.5' - Fracture or mechanical break, 45		strong (R3 to R4)  163.6-165.4' - moderate olive brown,	
170			/10	deg, smooth	Ш	(5Y 4/4), coarse grained, moderate	1
-127.2			2	168.9' - Fracture, horizontal, rough,	Ш	HCl reaction, medium strong (R3),	R21: 10 minutes
	171.0		NR	undulating 169.1' - Bedding plane, horizontal, smooth		<ul> <li>fossiliferous, voids (1/16-1/4") cover</li> <li>5-25% of surface</li> </ul>	1
				169.4' - Fracture, horizontal, fine grained limestone	$\mathbb{H}$	No Recovery 165.4-166.0' Limestone	1
_			>10	ilmestone 169.4-169.7' - Bedding plane, horizontal,	$\Box$	L climestone 166.0-170.4' - grayish yellow, (5Y	1
-				smooth, planar, limestone fragments	Ш	8/4), fine grained, weak (R2), poorly	1
_			>10	(1/4"-1/2" thick) 170.1-170.4' - Fracture, horizontal, slightly	₩	fossiliferous, 1/16"-1/8" voids over less than 10% of surface in thin	1
-	R22-NQ			rough, fracture faces indicate partial	$\blacksquare$	zones (1/2"-1-1/2" thick) on 1.0-1.5'	1
_	5 ft	0	>10	recrystallization 171.0-171.2' - Fracture zone, angular	$\pm$	spacing, cavities (up to 1/2") sparse and occur in zones with higher void	1
-	68%		>10	limestone fragments	+	content, thinly bedded zones 4"-6"	1
			- 10	171.2, 171.4' - Fracture or mechanical break, horizontal, smooth, 45 deg fracture on 3"		thick on 2.0-3.0' intervals, with fine grained zones rock is weak (R2) to	1
175 <u> </u>			NR	core piece	Ш	medium strong (R3)	R22: 10 minutes
-			INIX	171.4-171.8' - Mechanical break, 80 deg, rough, undulating, fracture is on a 5" core	₩	No Recovery 170.4-171.0' Limestone	Start of shift 5/4/07
_	176.0			piece	╆	- 171.0-174.4' - grayish yellow grading	1 -
_			1	171.8' - Fracture, horizontal, rough	Ш	to yellowish gray, (5Y 8/4 to 5Y 7/2),	1
_				171.9' - Mechanical break, 45 deg, rough 172.1-172.2' - Fracture zone, limestone	+	fine grained, moderate to strong HCl reaction, weak (R2), finer grained	1
_			3	fragments		than above, voids (1/16"-1/8")	1
_				172.2-172.4' - Bedding plane, horizontal, smooth, planar, numerous partings across	Ш	concentrated in thin horizontal zones  – along bedding plane/lamination	1
_	R23-NQ 5 ft	42	5	the zone, parting interval range from 1/4"-4"	₽	(1/16"-1/4") and very thin beds	1
_	88%			with most between 1/2"-2", laminated to very thinly bedded limestone	Щ	(1/2"-1-1/2") void rich zones, fine  grained laminated zones, high void	
			4	176.3' - Fracture, horizontal, rough,		zones spaced at 1.0'	
180_				undulating 177.6, 177.7, 177.8' - Bedding plane (3), —	$\mathbb{H}$	No Recovery 174.4-176.0'  Limestone	
-137.2			2	horizontal, smooth	Ħ	176.0-178.3' - moderate olive brown,	R23: 12 minutes
	181.0		NR	178.0, 178.1, 178.15' - Bedding plane (3), horizontal, smooth	Щ	(5Y 4/4), weak (R2), cavities ranging in size from 1/4"-1" cover 5-8% of	]
			4	178.3' - Fracture, horizontal, smooth, planar,	Н	surface, cavities elongated in	1
			1	contact with fine grained limestone 178.8' - Fracture, horizontal, smooth, planar,	Ш	horizontal direction, horizontal partings 1"-2" spacing in 177.3-178.3'	1
]				contact with void rich limestone below	Ш	178.3-178.6' - moderate yellowish	1
]			2	178.8-179.0' - Fracture zone, limestone	$\mathbb{H}$	gray, (5Y 7/2), very fine to fine grained, mild HCl reaction, medium	1
	R24-NQ			fragments 179.1' - Fracture or mechanical break, 75	$\Box$	strong to strong (R3 to R4), sharp	1
-	5 ft 100%	30	9	deg, rough 179.6, 179.7' - Fracture, rough, non planar	$\Box$	contact with the above, interbed	1
-				and undulating	╁╫	_ 178.6-180.4' - Same as 178.3-178.6' except olive brown, (5Y 4/4), strong	1
185			2	179.95' - Bedding plane, horizontal, smooth	Ш	HCl reaction, weak (R2), 1/16"-1/8"	1
-142.2				180.15' - Bedding plane, horizontal, smooth, _ planar	世	size voids cover 20-30% of surface, porous, laminated	-
-	106.0		3	180.4' - Bedding plane, horizontal, smooth,	$\Box$	No Recovery 180.4-181.0'	1
	186.0			planar			†
					-		-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-06	SHEET	11	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723312.3 N, 457814.1 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER LEVELS, 1.6 & Robert protection of the pro	CORING	INETHODA	ואט בנ	אורוטע	/IENT : CME 55 S/N 252345, mud rotary, NQ tools, HW o	asing			ORIENTATION : Vertical
DISCONTINUITIES  DESCRIPTION  DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS  THICKNESS, SURFACE STAINING, AND TIGHTNESS  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  THICKNESS, SURFACE STAINING, AND TIGHTNESS  THICKNESS, SURFACE STAINING, AND TIGHTNESS  THICKNESS, SURFACE STAINING, AND TIGHTNESS  THICKNESS, SURFACE STAINING, AND TIGHTNESS  THICKNESS, SURFACE STAINING, AND TIGHTNESS  THICKNESS, SURFACE STAINING, AND TIGHTNESS  THICKNESS, CAVING ROD DROPS, TEST RESULTS, ETC.  Limestone  181.0-186.0'- yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCI reaction, weak to medium strong (R2 to R3), fossiliferous (molds and casts) and voids (1/16-1/8") in horizontal zones 2"-4" thick and casts) and voids (1/16-1/8") in horizontal zones 2"-4" thick and 1"-1-1/2" spaced apart, trace cavities (up to 3/4"), fossils and larger voids show preferred orientation (horizontal), fossils and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding possible bottom of Boring at 186.0 f bys on	\MATED	LEVELS · E	f ha	on E	/02/07	141200	7	LOCCED: C. Suma	
DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS  181.5' - Fracture or mechanical break, high angle deg, rough, undulating, 8" long 182.6, 182.8' - Fracture, horizontal, slightly to moderately rough, planar, partings at zones of increased small voids  183.0-184.0' - Bedding plane, horizontal, slightly to moderately rough, planar, inclined lamination 184.7' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed 185.6, 185.7' - Fracture, horizontal, slightly rough, planar  DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  Limestone 181.0-186.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCI reaction, weak to medium strong (R2 to R3), fossiliferous (molds and casts) and voids (1/16-1/8") in horizontal zones 2"-4" thick and 1"-1-1/2" spaced apart, trace cavities (up to 3/4"), fossils and larger voids show preferred orientation (horizontal), fossil and void poor material is finely laminated with dark gray laminated with dark gray laminated with dark gray lamination or 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding plane controlled, Inclined laminations in sections, cross bedding plane controlled, Inclined laminations in sections, cross bedding possible  Bottom of Boring at 186.0 ft bgs on	WATER	LEVELS . 5.	ir bg:	5 UII 3/		<del>4</del> /200	T		
181.5' - Fracture or mechanical break, high angle deg, rough, undulating, 8" long 182.6, 182.8' - Fracture, horizontal, smooth, planar, partings at zones of increased small voids 183.0-184.0' - Bedding plane, horizontal, slightly to moderately rough, planar, Variable spacing from 1/2"-2-3/4" 184.25' - Fracture, horizontal, rough, non planar, inclined lamination 184.7' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed 185.6, 185.7' - Fracture (2), horizontal, rough, planar 185.6 - Fracture, horizontal, slightly rough, planar  Bottom of Boring at 186.0 ft bgs on  Limestone 181.0-186.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCI reaction, weak to medium strong (R2 to R3), fossiliferous (molds and casts) and voids (1/16-1/8") in horizontal zones 2"-4" thick and 1"-1-1/2" spaced apart, trace cavities (up to 3/4"), fossils and larger voids show preferred orientation (horizontal), fossil and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding plane controlled, Inclined laminations in sections, cross bedding possible  Bottom of Boring at 186.0 ft bgs on	> -	_	1		DISCONTINUITIES	ניז	L	LITHOLOGY	COMMENTS
181.5' - Fracture or mechanical break, high angle deg, rough, undulating, 8" long 182.6, 182.8' - Fracture, horizontal, smooth, planar, partings at zones of increased small voids 183.0-184.0' - Bedding plane, horizontal, slightly to moderately rough, planar, Variable spacing from 1/2"-2-3/4" 184.25' - Fracture, horizontal, rough, non planar, inclined lamination 184.7' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed 185.6, 185.7' - Fracture (2), horizontal, rough, planar 185.6 - Fracture, horizontal, slightly rough, planar  Bottom of Boring at 186.0 ft bgs on  Limestone 181.0-186.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCI reaction, weak to medium strong (R2 to R3), fossiliferous (molds and casts) and voids (1/16-1/8") in horizontal zones 2"-4" thick and 1"-1-1/2" spaced apart, trace cavities (up to 3/4"), fossils and larger voids show preferred orientation (horizontal), fossil and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding plane controlled, Inclined laminations in sections, cross bedding possible  Bottom of Boring at 186.0 ft bgs on	SHE	5%		S	DESCRIPTION	٦ŏ	Г	DOOK TYPE COLOR	
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181.5' - Fracture or mechanical break, high angle deg, rough, undulating, 8" long 182.6, 182.8' - Fracture, horizontal, smooth, planar, partings at zones of increased small voids 183.0-184.0' - Bedding plane, horizontal, slightly to moderately rough, planar, Variable spacing from 1/2"-2-3/4" 184.25' - Fracture, horizontal, rough, non planar, inclined lamination 184.7' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed 185.6, 185.7' - Fracture (2), horizontal, rough, planar 185.6 - Fracture, horizontal, slightly rough, planar  Bottom of Boring at 186.0 ft bgs on  Limestone 181.0-186.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCI reaction, weak to medium strong (R2 to R3), fossiliferous (molds and casts) and voids (1/16-1/8") in horizontal zones 2"-4" thick and 1"-1-1/2" spaced apart, trace cavities (up to 3/4"), fossils and larger voids show preferred orientation (horizontal), fossil and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding plane controlled, Inclined laminations in sections, cross bedding possible  Bottom of Boring at 186.0 ft bgs on	Ę¥\$	₩ <u>@</u> Ö		2.	PI ANARITY INFILLING MATERIAL AND	Ψĕ		AND BOCK MASS	
181.5' - Fracture or mechanical break, high angle deg, rough, undulating, 8" long 182.6, 182.8' - Fracture, horizontal, smooth, planar, partings at zones of increased small voids 183.0-184.0' - Bedding plane, horizontal, slightly to moderately rough, planar, Variable spacing from 1/2"-2-3/4" 184.25' - Fracture, horizontal, rough, non planar, inclined lamination 184.7' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed 185.6, 185.7' - Fracture (2), horizontal, rough, planar 185.6 - Fracture, horizontal, slightly rough, planar  Bottom of Boring at 186.0 ft bgs on  Limestone 181.0-186.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCI reaction, weak to medium strong (R2 to R3), fossiliferous (molds and casts) and voids (1/16-1/8") in horizontal zones 2"-4" thick and 1"-1-1/2" spaced apart, trace cavities (up to 3/4"), fossils and larger voids show preferred orientation (horizontal), fossil and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding plane controlled, Inclined laminations in sections, cross bedding possible  Bottom of Boring at 186.0 ft bgs on		Š LE DE		许严		Ιź			DROPS, TEST RESULTS, ETC.
angle deg, rough, undulating, 8" long 182.6, 182.8' - Fracture, horizontal, smooth, planar, partings at zones of increased small voids 183.0-184.0' - Bedding plane, horizontal, slightly to moderately rough, planar, Variable spacing from 1/2"-2-3/4" 184.25' - Fracture, horizontal, rough, non planar, inclined lamination 184.7' - Fracture, horizontal, smooth, planar 185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed 185.9' - Fracture, horizontal, slightly rough, planar  Barbara 181.0-186.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCl reaction, weak to medium strong (R2 to R3), fossiliferous (molds and casts) and voids (1/16-1/8") in horizontal zones 2"-4" thick and 1"-1-1/2" spaced apart, trace cavities (up to 3/4"), fossil and larger voids show preferred orientation (horizontal), fossil and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding plane controlled, Inclined laminations in sections, cross bedding possible  Bottom of Boring at 186.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCl reaction, weak to medium strong (R2 to R3), fossiliferous (molds and casts) and voids (1/16-1/8") in horizontal zones 2"-4" thick and 1"-1-1/2" spaced apart, trace cavities (up to 3/4"), fossils and larger voids show preferred orientation (horizontal), fossil and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding possible Bottom of Boring at 186.0 ft bgs on	поп	016	ш	шш		0)	L		
182.6, 182.8' - Fracture, horizontal, smooth, planar, partings at zones of increased small voids 183.0-184.0' - Bedding plane, horizontal, slightly to moderately rough, planar, Variable spacing from 1/2"-2-3/4" 184.25' - Fracture, horizontal, rough, non planar, inclined lamination 184.7' - Fracture, horizontal, smooth, planar 185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed 185.9' - Fracture, horizontal, slightly rough, planar  182.6, 182.8' - Fracture, horizontal, smooth, planar, Variable spacing from 1/2"-2-3/4" 184.25' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed 185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed 185.9' - Fracture, horizontal, slightly rough, planar			1			1	П		
planar, partings at zones of increased small voids  183.0-184.0' - Bedding plane, horizontal, slightly to moderately rough, planar, Variable spacing from 1/2"-2-3/4"  184.25' - Fracture, horizontal, rough, non planar, inclined lamination  184.7' - Fracture, horizontal, smooth, planar 185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, slightly rough, planar  185.9' - Fracture, horizontal, slightly rough, planar  185.9' - Fracture, horizontal, slightly rough, planar  185.9' - Fracture, horizontal, slightly rough, planar  185.9' - Fracture, horizontal, slightly rough, planar  185.9' - Fracture, horizontal, slightly rough, planar  185.9' - Fracture, horizontal, slightly rough, planar  185.9' - Fracture, horizontal, slightly rough, planar  185.9' - Fracture, horizontal, slightly rough, planar  185.9' - Fracture, horizontal, slightly rough, planar  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal, rough, undulating, contacts of thin fine grained interbed  185.9' - Fracture, horizontal,	-					1			
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183.0-184.0' - Bedding plane, horizontal, slightly to moderately rough, planar, Variable spacing from 1/2"-2-3/4" 184.25' - Fracture, horizontal, rough, non planar, inclined lamination 184.7' - Fracture, horizontal, smooth, planar 185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed 185.9' - Fracture, horizontal, slightly rough, planar  183.0-184.0' - Bedding plane, horizontal, silghtly rough, non planar, variable spacing from 1/2"-2-3/4" thick and 1"-1-1/2" spaced apart, trace cavities (up to 3/4"), fossils and larger voids show preferred orientation (horizontal), fossil and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding plane controlled, inclined laminations in sections, cross bedding possible Bottom of Boring at 186.0 ft bgs on					1 1 1 1		1		
slightly to moderately rough, planar, Variable spacing from 1/2"-2-3/4" 184.25' - Fracture, horizontal, rough, non planar, inclined lamination 184.7' - Fracture, horizontal, smooth, planar 185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed 185.9' - Fracture, horizontal, slightly rough, planar	-					1	H		
spacing from 1/2"-2-3/4" 184.25' - Fracture, horizontal, rough, non planar, inclined lamination 184.7' - Fracture, horizontal, smooth, planar 185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed 185.9' - Fracture, horizontal, slightly rough, planar  - United the planar inclined lamination in sections, cross bedding possible and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding plane controlled, inclined laminations in sections, cross bedding possible and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding plane controlled, inclined laminations in sections, cross bedding possible and void poor material is finely laminated with dark gray lamination < 1/8" thick, spaced variably throughout the rock, horizontal parting are bedding possible and void poor material is finely laminated with dark gray lamination or some planar inclined lamination in show preferred orientation in the province of the province	_					1	L		AM
184.25 <sup>T</sup> - Fracture, horizontal, rough, non planar, inclined lamination   184.7' - Fracture, horizontal, smooth, planar   185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed   185.9' - Fracture, horizontal, slightly rough, planar   -									
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184.7' - Fracture, horizontal, smooth, planar 185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed 185.9' - Fracture, horizontal, slightly rough, planar - Planar -	_				184.25' - Fracture, horizontal, rough, non	_	L		_
185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed   185.9' - Fracture, horizontal, slightly rough, planar   -									
undulating, contacts of thin fine grained interbed 185.9' - Fracture, horizontal, slightly rough, planar  gray lamination < 1/8" thick, spaced - variably throughout the rock, horizontal parting are bedding plane controlled, Inclined laminations in sections, cross bedding possible Bottom of Boring at 186.0 ft bgs on	-				184.7' - Fracture, norizontal, smooth, planar	1	F		-
interbed 185.9' - Fracture, horizontal, slightly rough, planar - Sections, cross bedding possible Bottom of Boring at 186.0 ft bgs on - Sections at 186.0 ft	_		1		undulating contacts of this fire grained	4	L		
185.9' - Fracture, horizontal, slightly rough, planar			1			1			
planar  controlled, Inclined laminations in sections, cross bedding possible  Bottom of Boring at 186.0 ft bgs on			1		185 0' - Fracture horizontal elightly rough	1	r		7
_ sections, cross bedding possible Bottom of Boring at 186.0 ft bgs on	-		1			-	F		_
Bottom of Boring at 186.0 ft bgs on			1		piana				
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-07	SHEET	1	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723243.7 N, 458250.5 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

						END 0/7/2027			ONIENTATION : Vertical
WATER	LEVELS	. 3.U IT DO	gs on 6/06		START : 6/5/2007	END: 6/7/2007 SOIL DESCRIPTION	LUGGER		Burkard, C. Dellaria, B. Ellis  COMMENTS
≷Q₽	SAMBLE	INTERVA	I (ft)	STANDARD PENETRATION TEST RESULTS		JOIL DEJONIF HON		SYMBOLIC LOG	OCIVIIVILINTO
ON (	SAMPLE		. ,	TEST RESULTS	SOIL NAM	IE, USCS GROUP SYMBOL	_, COLOR,	IC L	DEPTH OF CASING, DRILLING RATE,
ATI B		RECOVE			MOISTURE	E CONTENT, RELATIVE DE	ENSITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTEN	ICY, SOIL STRUCTURE, M	INERALOGY	SYM	INSTRUMENTATION
41.7	0.0			( )	_ Organic Mater	rial (OL)		$\approx$	
-	-	1.1	SS-1	1-2-2	0.0-0.1' - plant		/ -		-
-	1.		00 .	(4)	Poorly Graded  0.1-1.1' - olive	g <b>Sand (SP)</b> gray to light olive gray, (5	5Y 3/2 to 5Y		-
-	1.5				5/2), moist, loo	ose, no HCI reaction, silica	a present	ł	-
-	-						-	ł	-
-	-						-	ł	-
-	-						-	ł	-
-	_						-	ł	-
-							-	ł	-
							-	ł	-
5 36.7	5.0				Poorly Gradeo	d Sand With Silt (SP-SM)	<u> </u>	114	
-		1.0	SS-2	8-8-6	5.0-6.0' - dusk	y yellow to yellowish gray,	, (5Y 6/4 to 5Y -		-
-		1.0	33-2	(14)	//2), wet, loose	e, no HCl reaction, mottlin	ng at 5.6-5.7'	1111	-
-	6.5				1		-	ł	-
-	-						-	ł	-
-	_						-	ł	-
-	-						-		-
-							-	ł	-
-							-	$\mathbf{I}$	-
-							-	ł	-
10 <u> </u>	10.0			05.50/5	Lean Clay (CL	1		////	
-	100	0.9	SS-3	25-50/5 (75/11")	10.0-10.1 - pa	le blue, (5BP 6/2), low pla	asticity /-	Ī	-
-	10.9			, ,	Organic Mater	<b>rial (OL)</b> ownish black, (5YR 2/1), (	Pontaine roote	₩	-
-					Silt (ML)	OWITISTI DIACK, (5 th 2/1), (	-	ł	-
-					10.3-10.9' - gra	ayish yellow, (5Y 8/4), well	t, soft,	$\mathbf{I}$	-
-	-				moderate to st	rong HCI reaction		ł	-
-							-	ł	-
-	-						-	ł	-
-							-	ł	-
-							-	1	-
15 26.7	15.0	0.4	SS-4	50/4 5	Silt (ML)			Ш	
- 20.7	15.4	0.4	33-4	50/4.5 (50/4.5")	15.0-15.4' - gra	ayish yellow, (5Y 8/4), we noderate to strong HCl re	t, soft to	ш	-
-					\medium stiff, n	noderate to strong HCl re	action / _	ł	-
-	-						-	ł	-
-							-	1	-
-							-	-	-
-							-	1	-
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20								$\vdash$	
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-07	SHEET	2	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723243.7 N, 458250.5 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 3.0 ft bo	gs on 6/06	6/07 5	START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis
				STANDARD	SOIL DESCRIPTION O COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
21.7	20.8	0.0	SS-5	50/3	Limestone Fragments
_	:			(50/3")	20.0' - grayish yellow, (5Y 8/4), mild HCl reaction, trace voids on fragment surfaces, trace fossil casts
					\and molds, very little recovery
-					<u> </u>
-	-				1 1
-	_				- 1
-	_				- 1
25_	25.0				1 1
16.7	25.0				Silt With Sand (ML)
-	-	1.0	SS-6	18-25-35 (60)	25.0-26.0' - grayish orange, (10YR 7/4), wet to moist, soft to medium stiff, delayed moderate HCl reaction
-	26.5			(00)	
					]
_					<u> </u>
_					1 1
-	-				- 1
-					- 1
30	30.0				1 1
11.7	30.0				Silty Sand (SM)
-	•	0.9	SS-7	4-13-6 (19)	30.0-30.9' - dark yellowish orange, (10YR 6/6), wet, soft, delayed moderate HCl reaction
	31.5			(10)	
_					<u> </u>
-					
-					- 1
-					1 1
-	-				1 1
35	35.0				1
35 6.7	35.0 35.2	0.0	SS-8	50/2 (50/2")	Limestone Fragments  35.0' - few limestone chips recovered in split spoon, chips too small to assess
				(30/2)	chips too small to assess
-					
-					1 1
-	-				1 1
-	-				1 1
-	1				1 1
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40					1
1	I	l			1 1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-07	SHEET	3	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723243.7 N, 458250.5 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 3.0 ft b	gs on 6/06	6/07	START : 6/5/2007 END : 6/7/2007 LO	GGER	: J. I	Burkard, C. Dellaria, B. Ellis
				STANDARD	SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	s I			
		RECOVE	ERY (ft)	120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	,	/MB(	INSTRUMENTATION
				(N)	C'II MEIL II		S	
1.7	40.0			5-11-13	Silt With Limestone Fragments (ML) 40.0-41.25' - moderate yellowish brown, (10YR 5/4)	, -		_
_		1.3	SS-9	(24)	wet, medium stiff, moderate to strong HCl reaction,	´ _		_
_	41.5				gravel size particles up to 1"			_
_						_		_
_						_		_
_						_		_
_								_
_								_
_						_		_
45	45.0 45.3		00.40	50/0				
-3.3	45.5	0.3	SS-10	50/3 (50/3") /	Silt With Limestone Fragments (ML) 45.0-45.25' - Same as 40.0-41.25'	/-	Ш	_
-				(00/0)	(15.5 16.25 62.16 25 16.6 11.25			
_								_
_								_
_								
_								Driller's Remark: Lost 100% circulation from 47.5-48.0'
_								11:36 Pump chain broken, repair took 40
l _								minutes 13:20 Drill crew begins to insert HW casing -
l _								
50	50.0							
-8.3				8-2-1	Poorly Graded Sand With Silt (SP) 50.0-50.7' - grayish yellow, (5Y 8/4), wet, loose,			_
_		0.7	SS-11	(3)	delayed mild HCl reaction	_/-		_
_	51.5							_
_								_
_								_
_						_		_
_						_		_
-								_
-						_		_
55	55.0				011.00		<b>.</b>	_
-13.3				4-10-2	Silt With Limestone Fragments (ML) 55.0-56.0' - pale yellowish brown, (10YR 6/2), wet,			_
-		1.0	SS-12	(12)	soft, moderate to strong HCl reaction		Ш	_
_	56.5							_
_						_		_
_						_		_
_						_		_
-						_		_
_						_		_
-								_
60_								
			1					



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-07	SHEET	4	OF 1	0

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723243.7 N, 458250.5 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 3.0 ft bo	gs on 6/06	6/07 5	START : 6/5/2007 END : 6/7/2007 LOGGE	R:	J. I	Burkard, C. Dellaria, B. Ellis
				STANDARD	SOIL DESCRIPTION	$\int_{0}^{\infty}$	g	COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTATION
-18.3	60.0				Silt With Limestone Fragments (ML)	T	П	Driller's Remark: Keep losing circulation,
		1.1	SS-13	9-5-5 (10)	60.0-61.1' - moderate yellowish brown, (10YR 5/4), wet, soft, delayed strong HCl reaction, organic black	]		now advancing casing to 60' -
-	61.5			( - /	(N1) limestone fragments up to 3/4"	ľ		_
-						1		-
-						1		-
-						┨		-
-						┨		-
-						┨		-
65	65.0					1		-
-23.3					Silty Limestone Fragments (GM) 65.0-65.9' - yellowish brown, (10YR 5/4), wet, medium	•		<del></del>
1 -		0.9	SS-14	3-10-11 (21)	dense, strong HCl reaction, limestone fragments up to	]!		
-	66.5			. ,		1		_
-						4		-
-						1		-
-						+		-
-						1		-
-						1		-
70	70.0		00.45	50/0 75		1		-
-28.3	70.1	0.0	(SS-15)	50/0.75 (50/0.75")	Limestone Fragments 70.0' - yellowish gray, (5Y 7/2), delayed mild to	I		Driller's Remark: Casing set to 70.0', will begin rock coring on 6/6/07
-					moderate HCI reaction, trace fossil casts/molds, few thin fragments 3/4"-1"	1		-
-					Begin Rock Coring at 70.0 ft bas	4		-
-					See the next sheet for the rock core log	+		-
-						┨		-
-						1		-
-						1		_
-						]		
75					_	4		
-33.3						1		-
-						+		-
-						+		-
-						1		-
1 -						1		-
						]		
-						1		-
-						+		-
80						+		
1								



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723243.7 N, 458250.5 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 3.0	ft bg	s on 6/	06/07 START : 6/5/2007 END : 6	/7/2007	7 LOGGER : J. Burkard, C. Dellaria	ı, B. Ellis
<b>₹</b> □₽	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
FH B	E RU STH, OVEI	(%) 🛭	150 100 100 100 100 100 100 100 100 100	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURI	COR	S S	-RA(	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-28.3					1 7	Limestone	Start coring at 08:00 on
-	R1-NQ 1.5 ft	33	0	70.5, 70.8' - Mechanical break (2), <5 deg	+	- 70.0-70.9' - pale yellowish brown to	6/6/07
-	60%	33	NR	and 10-20 deg, rough, undulating, open 1/16"	士	grayish orange, (10YR 6/2 to 10YR 7/4), fine grained, strong HCl	Water level at 3.0' below ground surface
-	71.5		1411	and tight, respectively	-	<ul> <li>reaction, medium strong (R3), voids</li> </ul>	R1: 1 minute -
-			0	71.7, 72.0, 72.4-72.8' - Mechanical break (3)	+	(<1/16") over 5-10% of surface No Recovery 70.9-71.5'	Driller's Remark: Possible sand at bottom of run,
_						- Limestone	could have resulted in loss -
_			1	73.0' - Fracture, 5 deg, smooth, undulating	-	71.5-74.5' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR	of recovery SC-1 collected at 72.9-
_	R2-NQ			70.0 Fractare, 5 dog, ciriodal, anddidding	+	<ul> <li>7/4), medium to fine grained, strong</li> </ul>	74.0'
_	5 ft	28	0	74.0, 74.2' - Mechanical break (2), <10 deg,	<b>—</b>	HCl reaction, medium strong (R3), voids (<1/16") over 5-10% of surface,	-
	60%			rough, undulating, open 1/8"	丰	<ul> <li>10% cavities up to 5/8", black</li> </ul>	-
75 <u> </u>				-	士	organic infill No Recovery 74.5-76.5'	_
-			NR			-	R2: 4 minutes
-					+	_	-
_	76.5			76.5-76.7' - Fracture zone, rough, undulating,	+—	Limestone	-
_			>10	no visible orientation	-	<ul> <li>76.5-79.5' - dusky yellow, (5Y 6/4),</li> </ul>	-
_					+	medium grained, mild to moderate HCl reaction, medium strong (R3),	-
-			0	78.1' - Mechanical break	+	<ul> <li>fossil casts and molds, voids (&lt;1/16")</li> </ul>	-
-	R3-NQ			70.1 - Wechanical Dreak	+	over 25-50% of surface, cavities up to 3/8"	-
-	5 ft 96%	87	0		廿	_	-
	90%			79.4, 79.6' - Mechanical break (2), <5 deg	$\pm$	_ 79.5-81.3' - Same as 76.5-79.5'	-
-38.3			1	deg, rough, undulating, open _ 80.1' - Fracture, 5 deg, smooth, undulating	╁┼	<ul><li>except voids (&lt;1/16") over 10-30% of surface</li></ul>	_
-				55.1 Tradition, 5 deg, 51165th, anddating		_ Surface	R3: 5 minutes
_	81.5		0		山	_	-
_	01.3		NR	81.6, 81.8, 82.0, 82.3' - Bedding plane or	$\pm$	<ul> <li>No Recovery 81.3-81.5'</li> <li>Limestone</li> </ul>	-
_			4	mechanical break (4), <10 deg, rough,	+	81.5-82.6' - dusky yellow, (5Y 6/4),	-
_				undulating, tight to <1/16" open 82.5-83.0' - Fracture zone, rough, undulating,	+	<ul> <li>medium grained, mild HCl reaction, weak to medium strong (R2 to R3),</li> </ul>	-
_			>10	angles undeterminable	丰	surface cavities up to 1/2", fossil	-
-	R4-NQ			83.4' - Mechanical break or bedding plane,		<ul> <li>casts and molds</li> <li>82.6-83.5' - yellowish gray, (5Y 7/2),</li> </ul>	Core barrel got rock
-	5 ft 40%	8		<5 deg, rough, undulating, tight		fine to medium grained, strong HCl	sample jammed in the barrel causing the lost
85	,,		, <u>,  </u>		111	<ul> <li>reaction, very strong (R5), trace surface voids</li> </ul>	recovery
-43.3			NR	-	$\top$	No Recovery 83.5-86.5'	_
					$\Box$	_	R4: 3 minutes
	86.5				$\Box$	_	1
				86.7' - Mechanical break, 5-10 deg, rough,	1-	Limestone	]
1 7			>10	undulating, tight	$\Box$	<ul> <li>86.5-90.6' - dusky yellow, (5Y 6/4), medium grained, moderate to strong</li> </ul>	]
1 7				87.2-88.1 - Fracture zone, rough, undulating, angles between 70-90 degrees		HCl reaction, weak to medium strong	]
1 7			>10	· ·	1	<ul> <li>(R2 to R3), voids (&lt;1/16") over 80-75% of surface, surface cavities</li> </ul>	]
1 7	R5-NQ	40		88.4' - Mechanical break, <5 deg, rough, stepped, open 1/8"	$\mathbb{H}$	up to 1", trace amount of fossil casts and molds	]
1 7	5 ft 82%	48	0	Stoppod, opon no	$\Box$	– and moles	]
90					$\Box$		



PROJECT NUMBER:	BORING NUMBER:				
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723243.7 N, 458250.5 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS: 3.0	ft bgs	s on 6/	06/07 START : 6/5/2007 END	: 6/7/200	007 LOGGER : J. Burkard, C. Dellaria, B. Ellis		
≥∩ ≘	_			DISCONTINUITIES	ပွ	LITHOLOGY	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD	
-48.3	COR	a Q	O PER	THICKNESS, SURFACE STAINING, AND TIGHTNE	SS &	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.	
-			NR	90.4' - Fracture or mechanical break, <5 deg rough, undulating, open	,	_ No Recovery 90.6-91.5'	R5: 5 minutes	
-	91.5		0		片	Limestone - 91.5-94.8' - Same as 86.5-90.6'	-	
-			0	92.7' - Fracture or mechanical break, 5-10		-	-	
-	- R6-NQ - 5 ft	68	0	deg, rough, planar, open 93.3' - Fracture or mechanical break, 10 deg rough, undulating, tight	, 📙	-	-	
95 -53.3	82%		1	94.5' - Fracture or bedding plane, 5 deg, rough, undulating, open	井	– — 94.8-95.6' - dusky yellow, (5Y 6/4),		
-55.5 - -			NR	95.2' - Fracture, 10 deg, smooth, undulating, trace clay infilling 95.4' - Mechanical break or fracture		medium to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), trace surface voids, organic	R6: 6 minutes	
-	96.5			96.5-96.7' - Fracture zone		staining No Recovery 95.6-96.5'	-	
_			4	97.0' - Fracture or mechanical break		<ul> <li>Limestone</li> <li>96.5-98.4' - pale yellowish brown to</li> <li>grayish orange, (10YR 6/2 to 10YR</li> </ul>	SC-2 collected at 97.0- 98.0' -	
_	R7-NQ		0	98.4' - Bedding plane, <5 deg, rough,		7/4), fine grained, moderate HCl reaction, medium strong (R3), 15% surface voids	-	
_	5 ft 62%	48	0	undulating, tight	甘	<ul> <li>98.4-99.6' - pale yellowish brown to very pale orange, (10YR 6/2 to 10YR 8/2), medium grained, strong HCI</li> </ul>	-	
100 <u>-</u> -58.3 -			NR			reaction, medium strong to strong (R3 to R4), voids (<1/1/6") over 20-40% of surface, cavities up to 1/2", fossil casts and molds	R7: 5 minutes	
_	101.5					No Recovery 99.6-101.5'	-	
-			0	102.3-102.4' - Fracture, <5 deg, rough,		101.5-102.7' - Same as 98.4-99.6'     except increase in the number of surface cavities	-	
_	R8-NQ			undulating, open 1" with 1" fragment	甘	- No Recovery 102.7-106.5' -	-	
-	5 ft 24%	15	NID		F	_	]	
105_ -63.3			NR		븊		_	
	106.5				$\pm$	_	R8: 3 minutes	
-			0	106.9' - Mechanical break, 10-20 deg, rough	, ‡	Limestone - 106.5-108.5' - grayish orange, (10YR 7/4), medium grained, strong HCl	SC-3 collected at 106.9-	
-			0	undulating, tight  107.9' - Mechanical break, <5 deg, rough,	井	reaction, weak (R2), 15-20% surface voids	107.9'	
-	R9-NQ 5 ft	40	1	planar, tight 108.5' - Fracture, 5-10 deg, rough to smooth undulating	,	-	-	
110	56%				上		_	



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723243.7 N, 458250.5 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 3.0	ft bg:	s on 6	5/07 START : 6/5/2007 END : 6/7/2007		D7 LOGGER : J. Burkard, C. Dellaria, B. Ellis			
<b>≥</b> ∩≎	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS		
N (#	N, AND ≪ (%		ES T	DESCRIPTION	O LO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
H BE	E RU STH, OVEF	(%) <sub>Q</sub>	TUF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RO	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.		
-68.3	034					Limestone			
-			NR	-	Н	<ul> <li>108.5-109.3' - pale yellowish brown,</li> </ul>	R9: 2 minutes		
-	111 5				Ħ	_ (10YR 6/2), medium grained, mild HCl reaction, weak to medium strong	-		
-	111.5				Ħ	<ul> <li>(R2 to R3), voids (&lt;1/16") over</li> <li>20-40% of surface, no surface</li> </ul>	-		
-			>10	<5 deg, rough, undulating, open	Ш	cavities	-		
-				111.9-112.2' - Fracture zone, rough, undulating, angle undeterminable	Ш	<ul> <li>No Recovery 109.3-111.5'</li> <li>Limestone</li> </ul>	-		
-			0	-	Н	111.5-115.0' - Same as 108.5-109.3'	-		
-	R10-NQ			113.3' - Mechanical break, <5 deg, rough, undulating, open <1/16"	Ш	=	-		
-	5 ft 70%	43	>10	113.4-113.8' - Fracture zone, rough,	ш	_	-		
115			2	undulating, angle undeterminable 114.2, 114.6' - Bedding plane or mechanical	Ш	_	-		
-73.3				break (2), <5 deg, rough, undulating, open to 1/8"	Н	No Recovery 115.0-116.5'			
-			NR	- 1/0	Н		R10: 3 minutes		
-	116.5				Ħ		<u> </u>		
-			1		Ш	Limestone	·		
			1	117.2' - Bedding plane or mechanical break,	Ш	- 116.5-117.5' - Same as 108.5-109.3'			
				<5 deg, rough, planar, open to 1/8"	Н	No Recovery 117.5-121.5'	_		
_				_	Щ	_	_		
l _	R11-NQ 5 ft	13			Щ	_	_		
l _	20%	.0	NR		ш	_	_		
120				_	Ш		_		
-78.3					Н	_			
-					$\mathbb{H}$	_	R11: 3 minutes		
-	121.5			·	Ħ	_ Limestone	-		
-			0	121.6, 121.8-122.0' - Mechanical break (2), vertical, rough, undulating, tight	H	- 121.5-123.4' - grayish orange, (10YR	_		
-				-	Ш	7/4), medium grained, mild HCl reaction, weak to medium strong (R2	-		
-			2	122.8, 123.0' - Mechanical break or fracture	H	<ul> <li>to R3), trace fossil casts and molds,</li> </ul>	-		
-	R12-NQ			(2), <5 deg, rough, undulating, tight 123.4-123.7' - Fracture, 5 deg, smooth,	H	voids (<1/16") over 15-20% of surface, cavities up to 1/4"	-		
-	5 ft	48	2	planar	囯	<ul> <li>123.4-123.7' - yellowish gray, (5Y</li> </ul>	-		
-	70%		1	124.4' - Bedding plane or mechanical break,	団	7/2), fine grained, mild HCl reaction, strong (R4), fragmented	-		
125_ -83.3				<10 deg, rough, undulating, open 1" with 1" fragment	団	— 123.7-125.0' - Same as 121.5-123.4' <b>No Recovery 125.0-126.5'</b>	-		
-			NR		Ш		R12: 3 minutes		
-	126.5				$\mathbb{H}$	<u></u>	-		
-	126.5			126 7 126 9 126 0! Machanical break (2)	Ħ	Limestone	-		
1 -			0	126.7, 126.8, 126.9' - Mechanical break (3), 10-20 deg, rough, undulating, open <1/16"	Ħ	<ul> <li>126.5-127.9' - yellowish gray, (5Y 7/2), medium grained, mild HCl</li> </ul>	-		
-			0	127.6, 127.8' - Mechanical break (2), <5 deg,	H	reaction, medium strong (R3), fossil	-		
-				rough, undulating, tight to open 1/16"	Ш	<ul> <li>casts and molds, voids (&lt;1/16") over 20-30% of surface</li> </ul>	· -		
_	R13-NQ				Н	No Recovery 127.9-131.5'	_		
[ -	5 ft 28%	13			Ш		_		
130			NR		Ш				
1									



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-07	SHEET	8	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723243.7 N, 458250.5 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS: 3.0	ft bg	s on 6/	06/07 START : 6/5/2007 END : 6	7/200	LOGGER : J. Burkard, C. Dellaria	a, B. Ellis
<b>≩</b> Ω≨	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-88.3 -						-	R13: 2 minutes
- - - -	131.5 R14-NQ 5 ft 80%	33	2 0 >10	131.5' - Fracture, 5 deg, rough, planar 131.6' - Fracture, 5 deg, smooth, planar 132.1' - Bedding plane or mechanical break, <5 deg, rough, planar, tight 132.5-133.1' - Bedding plane (multiple), <5 deg, rough, planar, open <1/16" 133.8' - Mechanical break or fracture 134.0-134.7' - Fracture zone		Limestone  131.5-135.5' - dusky yellow to grayish yellow, (5Y 6/4 to 5Y 8/4), medium grained, mild HCl reaction, medium strong (R3), organic staining, fossil casts and molds, voids (<1/16") over 20-40% of surface	- - - - -
135_ -93.3 -			3 NR	134.7-135.3' - Fracture, 80 deg, tight 135.1' - Mechanical break, <5 deg, rough, planar, tight		No Recovery 135.5-136.5'	R14: 5 minutes
- - - - 140 -98.3	R15-NQ 5 ft 84%	22	>10 6 0 >10	136.5-137.3' - Fracture zone, rough, undulating, no visible orientation, organic staining 137.7-138.3' - Fracture zone, rough, undulating, no visible orientation 138.9, 139.4' - Mechanical break (2) 139.5-140.5' - Fracture zone, rough, undulating, no visible orientation		Limestone  136.5-137.1' - dusky yellow, (5Y 6/4), medium grained, weak to medium strong (R2 to R3), voids (<1/16")  over 30-50% of surface, organic staining 137.1-140.7' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCI reaction, voids (<1/16") over 10-15% of surface, organic staining, surface cavities up to 1"	- - - - -
-	141.5		NR			- No Recovery 140.7-141.5'	R15: 7 minutes
- - -	D40 NO		>10	141.5-142.5' - Fracture zone, rough, undulating, no visible orientation  142.7' - Fracture, 5 deg, smooth, undulating 143.1' - Mechanical break 143.3' - Fracture, 15 deg, smooth, undulating		Limestone  141.5-142.6' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), medium grained, mild HCl reaction, medium strong to strong (R3 to R4), 20-40% voids 142.6-144.5' - yellowish brown,	SC-4 collected at 143.4-
- 145_ -103.3	R16-NQ 5 ft 90%	40	0	143.5-145.9' - Mechanical break (4), <5 deg, rough, undulating, open <1/16"		- (10YR 6/2), fine to medium grained, strong HCl reaction, weak to medium strong (R2 to R3), 10% voids on - surface 144.5-146.0' - moderate olive brown, (5Y 4/4), medium grained, mild HCl	144.5'
- - -	146.5		0 NR 0	145.9' - Fracture, 70-80 deg, rough, undulating, tight 146.9, 147.5, 147.8' - Mechanical break (3), <5 deg, rough, undulating, tight		reaction, very weak to weak (R1 to R2), voids (<1/16") over 40-60% of surface, fossil casts molds  No Recovery 146.0-146.5' Limestone  146.5-148.1' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2),	- - -
- - - 150	R17-NQ 5 ft 100%	97	0	148.8' - Mechanical break, <10 deg, rough, undulating to planar, open to 1/4"		medium grained, mild HCl reaction, weak to medium strong (R2 to R3), 30-50% voids, trace cavities	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-07	SHEET	9	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723243.7 N, 458250.5 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER LEVELS: 3.0 ft bgs on 6/06/0				06/07 START : 6/5/2007 END :	6/7/2007	LOGGER : J. Burkard, C. Dellaria	ia, B. Ellis		
≥∩≘	_ (9			DISCONTINUITIES	_ ဗွ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
-108.3 - -	151.5		1	150.2' - Mechanical break, <5 deg, rough, undulating 150.4' - Fracture, 50-60 deg, rough, undulating, tight		148.1-150.5' - pale yellowish brown, - (10YR 6/2), fine grained, moderate to strong HCl reaction, medium strong (R3), 10-15% voids, 10% cavities - 150.5-151.5' - Same as 148.1-150.5'	SC-5 collected at 149.4- 150.3' - R17: 5 minutes		
-	R18-NQ		0	151.1' - Bedding plane or fracture, 5 deg, smooth, undulating, trace silica sand infill 151.6' - Bedding plane or fracture, 5 deg, rough, undulating 151.7' - Fracture, <5 deg, rough, undulating 152.2' - Bedding plane, <5 deg, rough, undulating to planar, tight		except yellowish gray, (5Y 7/2), 20-30% voids - 151.5-154.0' - Same as 148.1-150.5'	- - - -		
155_ -113.3	5 ft 94%	43	>10	152.7-153.2' - Fractures, 55-65 deg, rough, undulating, open <1/16" to partially healed 154.7' - Mechanical break, 5-10 deg, rough, undulating 155.0-155.9' - Fracture zone, possibly		154.0-155.4' - light olive gray, (5Y 5/2), fine grained, mild to moderate HCl reaction, weak (R2), 10-30% voids, trace cavities 155.4-155.9' - moderate yellowish			
-	156.5		3 NR >10	mechanical breaks  156.5-157.7' - Fracture zone, dominantly <10 deg, angular to subangular fragments 1"-3-1/2"		brown, (10YR 5/4), medium grained, mild HCl reaction, weak to medium strong (R2 to R3), 20-40% voids 155.9-156.2' - yellowish gray, (5Y 7/2), fine grained, moderate HCl	- - -		
-	R19-NQ 5 ft	20	0	157.7-158.2' - Mechanical break (3), rough, undulating, open <1/8"  158.7, 159.0' - Mechanical break (2), <10		reaction, medium strong to strong (R3 to R4), no voids No Recovery 156.2-156.5' Limestone 156.5-156.8' - Same as 155.9-156.2'	-		
160 -118.3 -	60%	20	NR	deg, rough, undulating to planar, open		156.8-159.5' - light olive gray, (5Y - 5/2), fine to medium grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4) - No Recovery 159.5-161.5'	R19: 4 minutes		
-	161.5		0 >10	161.5-161.6' - Mechanical break, multiple breaks, no visible orientation, limestone fragments to 1" 161.9' - Mechanical break or fracture 162.3-163.2' - Fracture zone, rough,		Limestone 161.5-165.2' - Same as 156.8-159.5' except medium grained, mild HCI reaction, 20-40% voids	- - -		
- - - 165	R20-NQ 5 ft   74%	37	0	undulating, angles undeterminable 163.4, 164.5' - Mechanical break (2)		- - -	SC-6 collected at 163.4- 164.5'		
-123.3 -	166.5		NR			No Recovery 165.2-166.5'	R20: 5 minutes		
			0	167.0, 167.4' - Mechanical break or fractures (2) 167.8, 167.9, 168.3' - Mechanical break or		Limestone - 166.5-175.5' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, moderate to strong HCI - reaction, weak (R2), 10-20% voids,	- - -		
- - 170	R21-NQ 5 ft 100%	62	4	fractures (3)  168.7-169.0' - Fracture, 10-30 deg, rough, undulating 169.3, 169.6, 170.0' - Mechanical break (3)		fossiliferous zone from 167.3-167.6' (molds and casts)	-		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-07	SHEET	10	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723243.7 N, 458250.5 E (NAD83)

ELEVATION: 41.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 3.0	ft bg	s on 6	/06/07 START : 6/5/2007 END : 6/	7/200	7 LOGGER : J. Burkard, C. Dellaria	ı, B. Ellis
300	<u> </u>			DISCONTINUITIES	O	LITHOLOGY	COMMENTS
N A N E	- ZN ≻ - ZN ≻		ËS	DESCRIPTION	100	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACING
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	3 Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-128.3	034	ш.	1	<u> </u>	10)		
-				-	$\vdash$	-	R21: 5 minutes
_			0	170.6' - Fracture, 5 deg, rough, undulating 170.9' - Mechanical break	ш	-	-
-	171.5			-	Н	_	-
_			>10	171.7' - Mechanical break	Ш	_	_
_				172.1-172.9' - Fracture zone	ш	_	_
-			>10	-	Н	_	_
-	B00 NO			173.3' - Mechanical break	$\vdash$	_	_
_	R22-NQ 5 ft	7	>10	173.6-175.5' - Fracture zone		_	_
_	80%				H	_	_
175_ -133.3			>10		Н	_	
-133.3				-	П	No Decement 175 5 470 5	D22: 5 minutes
_			NR	-	ш	No Recovery 175.5-176.5'	R22: 5 minutes
-	176.5			470 5 470 71	Ш	- 1:	_
-			3	176.5-176.7' - Fracture zone, irregular, angular rock fragments to 1"	Н	Limestone - 176.5-177.5' - light olive gray, (5Y	=
-				177.3' - Fracture, 30 deg, rough, planar	H	5/2), fine grained, moderate to strong HCl reaction, extremely weak to	-
_			2	177.4' - Fracture, horizontal, rough, planar	H	<ul><li>weak (R0 to R2), 10-30% voids, 10%</li></ul>	_
_				177.8-178.1' - Fracture zone, irregular angular rock fragments, top and bottom	Н	cavities	_
_	R23-NQ 5 ft	37	3	fractures are horizontal, rough, planar	Щ	177.5-181.0' - moderate yellowish - brown, (10YR 5/4), fine grained,	_
_	90%			178.6, 179.1, 179.4' - Fractures (3), 0-5 deg, rough, planar	Ш	weak to medium strong (R2 to R3),	_
180_			1	179.5' - Fracture, 50 deg, rough, undulating	Ш	10-20% voids —	
-138.3 -					Н	<del>-</del>	
_			4	180.5, 180.6, 180.85, 180.9' - 0-10 deg, rough, planar	H		R23: 5 minutes
_	181.5		NR			No Recovery 181.0-181.5'	_
_			1	_	Ш	Limestone - 181.5-182.5' - moderate yellowish	_
_				182.3' - Fracture, 30 deg, rough, undulating,	Н	brown, (10YR 5/4), fine to medium	
1 -			1	possible mechanical break 182.9' - Fracture, 20 deg, smooth, planar	П	grained, weak to medium strong (R2 to R3), 10-30% voids	
_				182.9 - Fracture, 20 deg, Sillootti, planai	ш	182.5-185.0' - pale yellowish brown,	_
1 -	R24-NQ 5 ft	72	4	183.75' - Fracture, 60 deg, rough, undulating	団	(10YR 6/2), fine grained, medium strong (R3), 10-20% voids, trace	Used natural break at _
1 -	94%			184.1' - Fracture, horizontal, rough, undulating	Н	cavities	183.75' to box to preserve specimen
185 <u>-</u> 143.3			1	184.3' - Fracture, 10 deg, smooth, planar —	F	195 0 196 21 polo vellevijeh brove-	_
- 143.3				184.4' - Fracture, horizontal, smooth, planar 184.8' - Fracture, horizontal, smooth,	H	185.0-186.2' - pale yellowish brown, (10YR 6/2), fine to medium grained,	R24: 7 minutes
-			2	undulating -	H	weak to medium strong (R2 to R3), 20-40% voids, 20-30% cavities up to	1124. / Hilliules
-	186.5		NR	185.7' - Fracture, 50 deg, rough, undulating 186.4' - Fracture, 5 deg, rough, undulating	H		
-				-	1	No Recovery 186.2-186.5' Bottom of Boring at 186.5 ft bgs on	Bottom of hole at 186.5',
-					1	- 6/7/2007	end of boring at 09:53, 6/7/07
-				-	1	_	-
-				-	1	_	-
-				-	1	_	-
-				-	1	_	-
-					$\vdash$		_
1							



PROJECT NUMBER:	BORING NUMBER:

338884.FL E-08

SHEET 1 OF 10

# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722897.6 N, 458228.0 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten, T. Williams

WATER	VATER LEVELS: 4.41 ft bgs on 3/06/07 START: 2/15/2007 END: 2/23/2007 LOGGER: R. Gomez, R. Bitely, T. Stewart											
				STANDARD	SOIL DESCRIPTION		COMMENTS					
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS								
JEE J		RECOVE	ERY (ft)	12011120210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	2	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND					
PTH JRFA EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	Ì	INSTRUMENTATION					
10.4				(N)		Ó						
42.4						4	Start drilling at 10:57 AM using 3-7/8" drag bit -					
_						1						
_						1	Water level is based on Ground Water Monitoring at LNP site (FSAR Table					
_						1	2.4.12.08)					
_						1						
_						1						
_	3.5						-					
_				3-3-4	Silty Sand (SM) 3.5-4.5' - dark yellow, (10YR 6/6), wet, loose, fine		_					
_		1.0	SS-1	(7)	grained silica sand, 15% nonplastic fines, trace	Ш	1					
5	5.0			. ,	organics /		_					
37.4						1	_					
_						1	_					
_						1						
						1	_					
						1	Driller's Remark: Silts and sands at 7.0', harder drilling					
_							Tractic drining					
	8.5						_]					
					Silty Sand With Limestone Fragments (SM) 8.5-10.0' - yellowish gray mottled with light brown, (5Y	$\rfloor  $	Driller's Remark: Switch to 3-7/8" tri-cone roller drill bit					
		1.5	SS-2	4-7-6 (13)	8/1 with 5YR 5/6), wet, medium dense, fine to coarse	Ш	Toller drill bit					
10_	10.0			(10)	grained, strong HCl reaction, 20% nonplastic fines,  15% fine to coarse gravel sized limestone fragments,	$\prod$	<u> </u>					
32.4					carbonate material							
						]	Driller's Remark: Hard drilling at 11'					
	13.5					$\perp$	_]					
					Silty Sand (SM) 13.5-15.0' - Same as 8.5-10.0' except 40-45% fine to		]]					
		1.5	SS-3	10-5-6 (11)	coarse gravel sized. 35% fine to coarse sand sized.		1					
15	15.0			\ ·/	15-20% nonplastic fines		<u> </u>					
27.4						]						
						]						
						]						
_												
						1						
						1						
	18.5											
_				4.00	Silty Sand With Limestone Gravel (SM) 18.5-20.0' - Same as 8.5-10.0'		<u> </u>					
		1.5	SS-4	4-6-6 (12)	10.0 20.0 - Odine do 0.0-10.0		1					
20	20.0			\ -/			1					
						Γ						



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-08	SHEET	2	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722897.6 N, 458228.0 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten, T. Williams

WATER	LEVELS	: 4.41 ft k	ogs on 3/0	06/07	START : 2/15/2007 END : 2/23/2007	LOGGEF	R : R.	Gomez, R. Bitely, T. Stewart
>				STANDARD	SOIL DESCRIPTION		g	COMMENTS
AND AND (#)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME LISCS CROLIB SYMBOL COL	OB	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE ATIC		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COL MOISTURE CONTENT, RELATIVE DENSITY	Y OR	BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERA	ALOGY	SYM	INSTRUMENTATION
22.4				(/				
-	-					-		-
-						-	1	-
-						_		_
_						_		_
_	23.5				Oliv (111)			
_	-			4-21-29	<b>Silt (ML)</b> 23.5-25.0' - grayish orange, (10YR 7/4), moist	t, hard, -		Driller's Remark: Lost 40% circulation
-	-	1.5	SS-5	(50)	nonplastic, rapid dilatancy, moderate HCl read 5% very fine grained sand-sized, carbonate m	ction,		-
25 <u> </u>	25.0				576 very line granieu sand-sizeu, carbonate in	ialeriai	Ш	<del></del>
'''-						-		-
-						-		-
-						-		-
-	-					-		-
-	1					-		<del>-</del>
	28.5					_		_
				0.10.11	Silt (ML) 28.5-29.5' - Same as 23.5-25.0' except 15-20°	% fine to -		
l _		1.0	SS-6	8-12-11 (23)	coarse sand-sized	/8 IIIIe to	Ш	_
30	30.0							
12.4						-		-
-						-		_
-						-		-
-	-					-		-
-						-		-
-	33.5					-		-
-	55.5				Silt With Sand (ML)	··· (E)/D	Ш	Set 4" HW casing to 35.0'
-	]	1.0	SS-7	21-18-21 (39)	33.5-34.5' - pale brown to pale yellowish brow 5/2 to 10YR 6/2), dry to moist, hard, nonplasti	c. rapid		-
35	35.0			(55)	dilatancy, mild HCl reaction, 20-25% fine to co	oarse _		
7.4					Journa Sizou, Haoo IIIo graver-sizou			Stopped at 12:45 PM after setting casing to 35.0'
-						-		Leave casing in at 35.0' until next shift
1 -						-		Start drilling 02/20/2007, continue with 3-7/8" tri-cone from 35.0' below ground surface -
1 -	-					-		4" HW casing at 35.0' below ground surface
-	-					-		-
-	00.5					-		-
-	38.5							-
-	-	1.4	SS-8	20-23-19		-		-
40	40.0			(42)		=		-
	.5.0							



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	E-08	SHEET	3	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722897.6 N, 458228.0 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten, T. Williams

DRILLIN	G METH	OD AND	EQUIPMI	ENT : CME 550X	S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 4.41 ft l	ogs on 3/0	06/07	TART : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart
> ~ ~				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	AL (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE ATIC		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR  DEFITIOR CASING, BRIEFING HATE,  DEFITIOR CASING, BRIEFING HATE,  DEFITIOR CASING, BRIEFING HATE,
EV.			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
2.4				(14)	Silt With Sand (ML)
-					│ \ 38.5-39.9' - moderate yellowish brown, (10YR 5/4), │ - │
-					moist, hard, nonplastic, rapid dilatancy, mild HCI reaction, 15-20% fine to coarse sand-sized, carbonate
-					material -
-					<b>- 1</b>
-					<b>- 1</b>
-	43:5				<b>†  </b>
-	49:8	0.0	SS-9	50/1.5	No Recovery 43.5-43.6' Driller's Remark: Slow drilling through dense
-				(50/1.5")	zone, light chatter
45					<b>                                     </b>
-2.6					Driller's Remark: Softer drilling, quick drilling,
-					little to no chatter
-					1
-					1
_					1
_					11
	48.5				11
				00.40.50/5	Silt (ML)
		1.2	SS-10	30-48-50/5 (98/11")	48.5-49.7' - pale brown, (5YR 5/2), moist to wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl
50_	49.9			, ,	reaction, 10-15% fine to medium sand-sized,
-7.6					Driller's Remark: Rapid advancement no chatter
-					_   Orialtor
_					<b></b>
_					_ <b>_                                  </b>
_					<b>.</b>
_					<b>.</b>
-	53.5				Silt With Sand And Limestone (ML)
-				18-12-36	53.5-54.7' - Same as 48.5-49.7' except 20-25% fine to
-		1.2	SS-11	(48)	coarse sand-sized, 4-8 interbeds of limestone up to  1/2" thick
55 <u> </u>	55.0				1/2 thick
-					
-					
-					<b>-   </b>
-					<b>   </b>
-					
-	E0 F				
-	58.5				Sandy Silt (ML)
-		1.2	SS-12	25-35-41	58.5-59.7' - Same as 48.5-49.7' except 25-30% fine to coarse sand-sized, 2-4 limestone interbeds up to 1/2"
60 60	60.0		55	(76)	thick
00	00.0				



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	E-08	SHEET	4	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722897.6 N, 458228.0 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten, T. Williams

WATER	LEVELS	: 4.41 ft k	ogs on 3/0	06/07	START : 2/15/2007 END : 2/23/2007 LOG	GGER	: R.	Gomez, R. Bitely, T. Stewart
				STANDARD	SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			SYMBOLIC LOG	
필시인		RECOVE	RY (ft)	120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		) Clc	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		MB	INSTRUMENTATION
집중급				(N)			S	
-17.6 _								Light chatter to 61.0'
l -								_
_								_
l _								_
l _						J		Driller's Remark: Rapid advancement, no chatter, few cemented silt grains (coarse to
								fine gravel size ) in cuttings
	63.5					1		
					Sandy Silt And Limestone (ML) 63.5-64.8' - Same as 58.5-59.7' except 35-40% of			_
-	]	1.3	SS-13	28-33-21 (54)	sample is limestone fragments	1		_
65	65.0			(34)			Ш	
-22.6								Driller's Remark: Light to moderate chatter
-	1					- 1		Steady advancement, cemented silt to - limestone fragments in cuttings
_	1					1		Slow advancement from 66.0'-68.0'
-	1					- 1		_
-	1					1		Driller's Remark: Light to no chatter
_	1					1		-
-	68.5					-		Moderate chatter
-	68.6	0.0	SS-14	50/1	No Recovery 68.5-68.6'			Switch to NQ tooling at 68.5'
-	1			(50/1")	Begin Rock Coring at 68.5 ft bgs See the next sheet for the rock core log	- 1		16:20 PM begin cleaning boring with NQ
70	-				See the flext sheet for the rock core log	- 1		tooling
70 <u> </u>	-					-		_
-	-					- 1		-
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PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-08

SHEET 5 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722897.6 N, 458228.0 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, NQ tools, HW casing

				IENT : CIVIE 330X 3/N 340233, ITIUU TOLAIY, NQ LOOIS, HVI			ORIENTATION : Vertical
WATER	LEVELS : 4.4	1 ft b	gs on :		23/200		
30₽	(%			DISCONTINUITIES	ဗ္က	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACING
ᆱ병은	RUN H, 4	(%) 🛭	N I	DEDTIL TYPE OBJENTATION BOUGHNESS	1 ≒ 1	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
YFA Y	Sof	0	ACT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	√BC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SUF	COF	A Q	FR/	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	68.5				H	Limestone	
_	R1-NQ		4	68.75' - Mechanical break, 10 deg, smooth,	ш	- 68.5-69.2' - light olive gray, (5Y 5/2),	68-70' advancement slow -
	1.5 ft	0		undulating	ш	very fine grained, mild HCl reaction,	with heavy chatter 68.5-69',
70	47% 70.0		NR	68.85, 69.0, 69.1, 69.2' - Mechanical break (4), 10 deg, smooth, undulating		weak to medium strong (R2 to R3),	little to no chatter 69.0-
-27.6	70.0			(4), To deg, smooth, diludiating	Ш	<ul> <li>fossiliferous, trace 15% organics</li> <li>No Recovery 69.2-70.0'</li> </ul>	R1: No time recorded
-			>10	70.55- 70.8' - Fracture zone, rough, stepped,	H	Limestone	-
-				no visible orientation	Ш	<ul> <li>70.0-73.3' - light olive gray, (5Y 5/2),</li> </ul>	-
			5	70.8-71.15' - Mechanical break, vertical,	Ы	very fine grained, mild HCI reaction,	_
				smooth, undulating		very weak to weak (R1 to R2),	
	R2-NQ			71.15' - Mechanical break, 25 deg, rough,	ш	<ul> <li>fossiliferous, voids up to 3/16" cover 50% of surface</li> </ul>	1
_	5 ft	38	1	undulating 71.3-71.45' - Mechanical break, vertical,	Н	_	-
_	66%			smooth, undulating	凵	=	
			_1_	71.5' - Mechanical break	Ш	- No Recovery 73.3-75.0'	
				71.75' - Mechanical break, <10 deg, rough,	Ш		]
			NR	undulating - 72.5' - Fracture, 50 deg, smooth, undulating	口		R2: 6 minutes
				72.5 - Fracture, 50 deg, smooth, undulating	Н	-	2/20/07 Stop drilling for the
75 -32.6	75.0			_	ш	Limostono	day —
-32.0			1	75.1' - Mechanical break, <10 deg, smooth,	Н	Limestone - 75.0-78.3' - light olive gray, (5Y 5/2),	Resume drilling 2/21/07 at _
			'	undulating	$\vdash \vdash$	very fine grained, mild to moderate	08:13
-				-	Ш	HCl reaction, weak to medium strong	SC-1 collected at 76.3-
_			1	76.35' - Fracture, 20 deg, smooth, undulating	Н	- (R2 to R3), bedding plane	77.4' -
_	50.110			<u>-</u>	Ш	laminations, some with organics (black laminations), voids up to 3/16"	=
_	R3-NQ 5 ft	57	1	77 4' Fracture 20 deg amonth undulating	Щ	- cover 25-50% of the surface	_
	66%	0,		77.4' - Fracture, 20 deg, smooth, undulating	Ш		
			3	78.05' - Mechanical break, 30 deg, smooth,	$\vdash$	「 <u> </u>	
_				undulating	╁┼	- No Recovery 78.3-80.0'	-
-			NR	78.15' - Bedding plane, 10 deg, smooth, undulating, intersecting a vertical fracture	Ш	-	R3: 6 minutes
_				78.35' - Bedding plane, <10 deg, smooth,	Н	_	-
	80.0			undulating			
-37.6			_	80.1' - Mechanical break, 80 deg, rough,	Ш	Limestone	
			5	undulating	Ш	<ul> <li>80.0-82.8' - light olive gray, (5Y 5/2), very fine grained, mild to moderate</li> </ul>	1
-				80.3' - Bedding plane, <10 deg, smooth,	口	HCl reaction, very weak to medium	
-			1	undulating 80.55' - Bedding plane, <10 deg, smooth,	Н	<ul> <li>strong (R1 to R3), moderately</li> </ul>	
				undulating -	Ш	competent at 80.0-80.55' and	<u> </u>
	R4-NQ	20	2	80.9-81.0 - Fracture zone, <10 deg, rough,	Н	81.2-82.8', voids up to 3/16" over 50% of surface, fossiliferous, trace	Driller's Remark: Lost up to 80% circulation at 82.0'
1 7	5 ft 56%	38		undulating, multiple fractures 81.2' - Fracture, 15 deg, smooth, undulating		bedding plane laminations, very	00 /0 Circulation at 02.0
-				82.5' - Mechanical break, <45 deg, rough,	Ш	weak rock (R1) with very fine	−
-				undulating -	Ш	granular surface at 80.55-81.2'	-
_			NR	82.7' - Fracture, 65 deg, smooth, undulating	口	No Recovery 82.8-85.0'	DALC minutes
				_	Н	_	R4: 6 minutes
85	85.0						
-42.6				85.0-85.45' - Fracture zone, rough,	$\vdash \vdash \vdash$	Limestone	
-			>10	3, 11, 11, 11, 11, 11, 11, 11, 11, 11, 1	世	- 85.0-88.8' - dark yellowish brown to	-
-				85.45' - Mechanical break, 20 deg, rough, _ undulating	ш	light olive gray, (10YR 4/2 to 5Y 5/2), very fine grained, mild to moderate	-
_			>10		ш	HCl reaction, very weak to medium	]
				86.0' - Mechanical break, 25 deg, rough,	$\Box$	strong (R1 to R3), voids up to 1/2"	
	R5-NQ			undulating	Н	cover 20-30% of the surface, small	]
	5 ft 76%	43	2	86.0-86.3 - Fracture zone, <20->70 deg, -multiple fractures, rock fragments	Ш	<ul> <li>voids (&lt;3/16") cover 60-80% of surface, fossiliferous (molds/casts)</li> </ul>	
-	1070				$\vdash\vdash\vdash$		-
					H		-



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E-08 SHEET 6 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722897.6 N, 458228.0 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.4	11 ft b	gs on 3	3/06/07 START : 2/15/2007 END : 2/2	23/20	D7 LOGGER : R. Gomez, R. Bitely,	Γ. Stewart
>∩≎	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
90	90.0		2 NR	86.75, 87.25, 87.55, 88.0, 88.8' - Bedding plane or fracture (5), <10-15 deg, smooth, undulating		- No Recovery 88.8-90.0'	SC-2 collected at 88.1- 88.8' - R5: 5 minutes _
-47.6 -			1			Limestone 90.0-95.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 6/1), very	
-			4	91.15, 91.4, 91.55, 91.8' - Bedding plane (4), <10 deg, smooth, undulating		fine grained, moderate HCl reaction,  extremely weak to medium strong (R0 to R3), fossiliferous	-
_	R6-NQ 5 ft 100%	45	8	92.05, 92.15, 92.25' - Mechanical break (3) 92.4, 92.8' - Bedding plane, <10 deg, smooth, undulating	$\vdash$	casts/molds), trace organics throughout and in thin laminations at 91.0-94.55', voids up to 1/2" from 90.65 to 91.8', voids up to 3/16" cover 50-75% of surface at 90.0-91.8' and 92.8-95.0' (decreasing	-
-			2	92.7' - Fracture, 75 deg, smooth, undulating 92.9' - Fracture, 75 deg, smooth, undulating, mirror of fracture at 92.7	H		-
95	95.0		4	93.0' - Mechanical break, 10 deg, rough, undulating 93.25' - Mechanical break, 50 deg, rough,		w/depth), extremely weak (R0) rock zone at 91.8-92.8', friable along bedding plane laminations	R6: 3 minutes
-52.6			1	93.55, 94.25, 94.45' - Mechanical break (3), <10 deg and 50 deg, rough, undulating	H	Limestone 95.0-97.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very	-
-	R7-NQ 5 ft 40%		4	94.55' - Bedding plane, smooth, undulating, organics 95.75' - Fracture, 20 deg, rough, undulating,		fine grained, moderate HCl reaction, weak (R2), voids up to 3/16" cover 30-40% of the surface, voids	
-		20	NR	low angle 96.25, 96.45, 96.65, 96.75' - Fracture (4), <10 deg, smooth, undulating		increase with depth, fossiliferous with few macrofossils, trace bioturbation indications, trace organics No Recovery 97.0-100.0'	
-				-	${\mathbb H}$	-	R7: 7 minutes
100 -57.6 -	100.0		0		H	Limestone - 100.0-102.9' - yellowish gray to light	Driller's Remark: Lost 100% circulation at 100.0' -
-			1	100.85' - Mechanical break		olive gray, (5Y 7/2 to 5Y 5/2), very fine grained, mild to moderate HCl reaction, weak (R2), voids (3/16")	SC-3 collected at 100.85- 101.9'
-	R8-NQ 5 ft	47	3	101.9, 102.15, 102.65, 102.9' - Fracture or bedding plane (4), <10 deg, smooth, undulating	H	cover 30% of the surface decreasing w/depth to no voids, less than 5% voids from 102.15-102.9',	-
-	72%		>10	102.9-103.6' - Fracture zone, rough, stepped, multiple intersecting fractures		fossiliferous with few small macrofossil molds, trace bioturbation and trace organics 102.9.103.61 yellowich gray to light	-
105	405.0		NR	- -		102.9-103.6' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), moderate HCl reaction, extremely weak (R0), silt to very fine	R8: 11 minutes
105 -62.6	105.0		5			sand-sized grains, bioturbation  No Recovery 103.6-105.0'	
-			>10	105.8' - Mechanical break, 40-70 deg, rough, undulating 105.85-106.1' - Fracture zone, multiple	Ħ	-	]
-	R9-NQ 5 ft 74%	28	>10	intersecting fractures 106.35' - Fracture, 50 deg, rough, undulating 106.55' - Mechanical break		-	]
-	1770		6	106.8' - Fracture, 75 deg, smooth, undulating	H	-	



PROJECT NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722897.6 N, 458228.0 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, NQ tools, HW casing

WATER	LEVELS: 4.4	1 ft b	gs on 3	3/06/07 START : 2/15/2007 END : 2/	23/20	D7 LOGGER : R. Gomez, R. Bitely,	Γ. Stewart
≥∩≘	(%)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 110	110.0		NR	106.9-107.4' - Fracture zone, rough, stepped, multiple intersecting fractures 107.4, 107.7' - Fractures, 60 deg and 70 deg, rough, undulating 107.7-108.0' - Fracture zone, rough, stepped, —		Limestone  105.0-108.7' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 3/2), very fine grained, moderate HCl reaction, extremely weak to weak (R0 to R2),	R9: 5 minutes
-67.6 - - - - - -	R10-NQ 5 ft 1 48%	20	7 3 1 NR	gravel-sized rock fragments 108.35-108.7' - Fracture zone, rough, stepped 110.0-110.65' - Fracture zone, smooth, undulating, bedding plane and other intersecting fractures 111.25' - Fracture, 60 deg, smooth, undulating 111.5' - Fracture, 60 deg, smooth, undulating 111.75' - Bedding plane, <10 deg, smooth, undulating 112.0' - Fracture, 70 deg, smooth, undulating		rock strength varies along length of core, voids up to 3/16" cover 30-60% of the surface, cavities up to 1/4" rare, fossiliferous, few macrofossil casts and molds, trace bioturbation and organics  No Recovery 108.7-110.0'  Limestone  110.0-112.4' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 3/2), very fine grained, moderate HCI reaction, extremely weak to weak (R0 to R2),	-
- 115 -72.6	115.0		5	115.1, 115.3, 115.45, 115.6' - Bedding plane (4), <10 deg, smooth, stepped		rock strength variable with depth, voids up to 1/2" rare, decreasing with depth, voids up to 3/16" over 80% of surface, fossiliferous with few macrofossils (casts/molds), trace	R10: 5 minutes
- - -	R11-NQ		3	116.0' - Fracture, 50 deg, smooth, stepped 116.3, 116.45, 116.9, 117.05' - Bedding plane (4), <10 deg, smooth, undulating		organics No Recovery 112.4-115.0' Limestone 115.0-118.7' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 3/2), very	
- - -	5 ft 74%	38	4 2 NR	117.2' - Mechanical break, 20 deg, rough, stepped, open 1" 117.3, 117.55' - Mechanical break (2), <10 deg, smooth, undulating 118.1, 118.4' - Fracture (2), 40 deg and 70 deg, smooth, undulating, trace staining on fracture at 118.4'		fine grained, mild HCl reaction, very weak to weak (R1 to R2), voids up to 1/2" is rare, voids up to 3/16" cover 70% of surface, fossiliferous with minor macro fossils (casts/molds), variable competence with rock weakness at breaks/ discontinuities	R11: 8 minutes
120 -77.6 -	120.0		8	120.0-120.35' - Fracture zone, multiple intersecting fractures including a 60 deg fracture with trace staining 120.65, 120.75, 121.05' - Mechanical break		No Recovery 118.7-120.0' Limestone 120.0-121.2' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 3/2), very fine grained, mild HCl reaction, very	
-	R12-NQ 5 ft 24%	0	NR	(3), 0-20 deg, rough, undulating - - - - -		<ul> <li>weak to weak (R1 to R2), cavities up to 1/2", voids up to 3/16" cover 30-80% of surface, fossiliferous, with macrofossils prevalent at 120.35-121.2'</li> <li>No Recovery 121.2-125.0'</li> </ul>	
125 -82.6	125.0		>10	125.0-125.2' - Fracture zone, rough, undulating, multiple intersecting fractures		Limestone  125.0-126.1' - yellowish gray to light	R12: 5 minutes
- - - -	R13-NQ 5 ft 22%	7	O NR	125.6' - Mechanical break, horizontal, rough, undulating 125.8' - Fracture or mechanical break, 40 deg, rough, undulating 125.95' - Mechanical break, horizontal, rough, undulating		olive gray, (5Y 7/2 to 5Y 3/2), very fine grained, mild HCI reaction, weak to medium strong (R2 to R3), cavities up to 1" cover 10-15% of surface, voids up to 3/16" cover 60-90% of surface, macrofossils (molds/casts)  No Recovery 126.1-130.0'	



PROJECT NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722897.6 N, 458228.0 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, NQ tools, HW casing

				ENT : CIVIE 550X 5/N 540255, Midd Totally, NQ tools, HV			ORIENTATION . Vertical
WATER	LEVELS : 4.4	1 ft b	gs on (		23/20		
ŞΩ£	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	ŽĄŽ		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ACE	SĘŖ	(%) <sub>Q</sub>	158	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	딩	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
TAN S	NG NG NG NG NG NG NG NG NG NG NG NG NG N	ο	RAC ER F	PLANARITY, INFILLING MATERIAL AND	₩	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	8.50	ď	표명	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	2.0.0, 1201.12002.10, 2.0.
					Ш		
				-	世		R13: 9 minutes
120	400.0				╁	-	14:00-15:00 PM HW
130 -87.6	130.0				世	Limestone	casing unscrewed at 10.0', —
-			4	130.4' - Fracture, smooth, undulating, open	₽₽	- 130.0-131.5' - light olive gray, (5Y	removed NQ to retrieve _ HW
_				130.75' - Fracture or mechanical break, 20	ш	5/2), very fine grained, mild HCl	15:00-16:30 PM Advanced -
			1	deg, smooth, undulating	┰	reaction, weak to medium strong (R2 to R3), voids up to 3/16" cover 50%	HW casing from 35.0'-70.0'
				131.0' - Fracture or mechanical break, <10 deg, smooth, undulating		of surface, few cavities up to 1/4"	17:30-18:30 PM NQ tooling locked in slough at 100'
	R14-NQ			131.3' - Fracture, rough, undulating, open	$\vdash$	diameter, few macrofossil molds,	below ground surface,
_	5 ft 30%	18		-	ш	<ul><li>potential gaps from fines washing out at 130.05', 130.4', and 131.3', 3/4"</li></ul>	back hammering to retrieve
	0070		NR		╁	iron cemented sand (no HCl reaction,	18:00-18:30 PM little to no – movement, stop for the day
			` ''`		Ė	very fine grained, medium strong	2/21/07 Stop drilling for the
1 -					╀	[R3]) at 130.0-130.05'  No Recovery 131.5-135.0'	day -
1 -					仜	-	2/22/07, 07:00-12:30 PM Retrieved tooling and
	135.0				ᅪ		cleaned out boring from
-92.6				135.0, 135.2' - Fracture (2), <10 deg, smooth, undulating	广	Limestone - 135.0-135.2' - pale yellowish brown	85.0-130.0'
				undulating	H	to olive gray, (10YR 6/2 to 5Y 4/1),	Advanced HW casing to 585.0'
_				-	ш	very fine grained, mild HCl reaction.	R14: 10 minutes
-			NR		╁┈	- weak to medium strong (R2 to R3),	Very fine sand-sized grains
-	R15-NQ			-	匚	voids up to 1/16" cover 30% of surface, possible worm burrows at	in drilling mud (identified by _ grit between fingers), black
_	5 ft	0			╁┷	– 135.0-135.2'	grains (possibly heavy
_	24%				ш	No Recovery 135.2-138.0'	minerals) present in grit
			0	138.15, 138.25' - Mechanical break, variable	一	Limestone - 138.0-138.8' - light olive gray to olive	only, not sample Continuous slow
				angles, variably open 138.25-138.65' - Fracture zone, coarse		gray, (5Y 6/1 to 5Y 4/1), fine grained,	advancement through
			NR	gravel-size rock fragments, visible signs of	H	moderate HCl reaction, weak to	interval, no void
140	140.0		INIX	mechanical wear	$\vdash$	<ul> <li>medium strong (R2 to R3), crystalline surfaces visible to naked eye,</li> </ul>	R15: 13 minutes - 15:15 PM 0.8'-long section
-97.6	140.0				ш	macrofossil molds up to 3/4"x1/4"	of core retrieved from
1 -			>10	stepped, infilling	⊣	- (spiral gastropod), voids up to 3/16"	cutting shoe of core barrel,
1 -				140.45' - Bedding plane, horizontal, rough, undulating, 1/4" open	片	variable 0-30% over surface, bedding plane laminations rare, trace	logged as R15 core from _ 138.0-138.8'
1 -			10	140.9-141.6' - Fractures or bedding plane,	$oldsymbol{oldsymbol{eta}}$	organics	2/22/07 Stop drilling for the
1 _				70-90 deg, rough, undulating	ഥ	No Recovery 138.8-140.0'	day at 140.0'
	R16-NQ	23	6	141.9' - Mechanical break, 10 deg, rough, undulating	⊣	Limestone 140.0-140.45' - dark yellowish brown	Begin drilling 2/27/07 at
1 7	5 ft 74%	۷3		141.95-142.1' - Fracture zone, 50-70 deg,	Ë	to light olive gray, (10YR 4/2 to 5Y	- 00.70
1 7			3	smooth, undulating	╨	5/2), fine to medium grained,	1
1 -			dash	142.2' - Bedding plane, horizontal, smooth, undulating	仜	<ul> <li>moderate to strong HCl reaction, extremely weak (R0), poorly</li> </ul>	=
-			l l	142.4' - Fracture, 70 deg, rough, undulating	+	competent with some silty sand and	R16: 10 minutes
1 -			NR	142.6, 143.0, 143.2, 143.55' - Fractures (4),	F	gravel, angular grains up to gravel	<u> </u>
145 -102.6	145.0			rough, stepped, variably open (<1/8")	世	size, trace bedding plane laminations and organics	
-102.0			>10	145.0-145.45' - Fracture zone or mechanical break, rough, undulating	П	-	_
				145.8, 146.1, 146.26, 146.35, 146.5, 146.6,	H		
1 7			[ , ]	146.7' - Bedding plane (7), <10 deg, smooth,	F		
1 1			8	undulating	世		1
	R17-NQ			146.7-148.0' - Fracture, 70-90 deg, smooth to rough, undulating to stepped, with multiple	${\mathbb H}$	<del> -</del>	1
1 -	5 ft	13	>10	intersecting bedding plane and subhorizontal	仜	<u> </u>	-
1 -	70%		5	fractures	₩	<del> </del>	-
			ြ	148.1' - Fracture, 50 deg, smooth, undulating	Ħ		-
1					1		
					1		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

E-08

SHEET 9 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722897.6 N, 458228.0 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, NQ tools, HW casing

WATER	LEVELS : 4.4	11 ft b	gs on :	3/06/07 START : 2/15/2007 END : 2/2	23/20	D7 LOGGER : R. Gomez, R. Bitely,	Γ. Stewart
				DISCONTINUITIES	ß	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACING
불하는	RUI H. / VER	Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	<b>1</b>	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
FR-F	ORE ING	αD	RAC-	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	252	₾	F E	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	21.6. 6, 1201 112621.6, 216.
_				148.3' - Bedding plane, <10 deg, smooth, undulating to stepped, <1/4" open	Н	140.45-143.7' - dark yellowish brown - to grayish olive with light gray	
			NR	undulating to stepped, < 1/4 open		mottling, (10YR 4/2 to 10Y 4/2 with	R17: 17 minutes
150	150.0			_	Ш	N7), very fine grained, moderate HCl	1
-107.6	100.0			— 150.15' - Bedding plane, <10 deg, rough,	H	<ul> <li>reaction, weak to medium strong (R2 to R3), voids over 30-40% of surface</li> </ul>	1
_			6	undulating		and vesicles over 60-80% of the	1 1
-				150.3, 150.55, 150.6' - Bedding plane (3),	Н	<ul> <li>surface, unfilled voids/cavities up to 1"x1/2" especially at 143.5-143.7',</li> </ul>	1
_			5	150.7' - Mechanical break, 50-90 deg, rough,	ш	heavy bioturbation and secondary	1
-	R18-NQ			stepped -	Н	infill of voids	1
-	5 ft	30	8	151.05, 151.25, 151.5, 151.8, 152.05' - Bedding plane (5), rough, undulating	$\mathbf{H}$	No Recovery 143.7-145.0' Limestone	l -
_	84%			151.95' - Mechanical break, vertical, rough,	亡	– 145.0-145.45' - Same as	-
-			5	stepped 152.05-152.25' - Fracture, vertical, smooth,	₽	140.45-143.7' 145.45-146.7' - light olive gray, (5Y	1 -
-			igsquare	undulating, with 3 horizontal intersecting	Щ	5/2), very fine grained, moderate to	]
-				fractures	口	strong HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16"	R18: 9 minutes
155_	155.0		NR	152.5' - Fracture, 40 deg and 60 deg, rough, stepped	Н	cover 20% of the surface, few macro	
-112.6			5	152.85' - Fracture, 10-70 deg, smooth,	Ë	fossils, laminated subhorizontal	
			5	undulating 152.95' - Fracture, 75 deg, smooth,	$\vdash$	bedding with organics, minor bioturbation decreasing with depth	155-156' Slow
_				undulating		146.7-148.5' - Same as	advancement -
_			3	153.1' - Mechanical break 153.4-153.65' - Fractures (4), 20-70 deg,		145.45-146.7' except rare laminations, no to trace organics	1
-	R19-NQ			smooth, undulating	H	No Recovery 148.5-150.0	156-158' Slightly faster
_	5 ft 72%	23	5	154.0' - Bedding plane, rough, undulating,	Ħ	Limestone	advancement -
-	1270		2	<1/4" open 155.15, 155.45, 155.5' - Bedding plane (3),	L	_ 150.0-152.05' - dark yellowish brown to light olive gray, (10YR 4/2 to 5Y	1
-				<10 deg, smooth to rough, undulating	╀	5/2), very fine to fine grained, mild to	1
-			NR	156.0' - Mechanical break, 20 deg, rough, undulating	ш	moderate HCl reaction, weak to medium strong (R2 to R3), voids	R19: 7 minutes
-			INIX	156.15, 156.4' - Bedding plane, <10 deg,	ш	<ul><li>(&lt;1/16") over 80-100% of surface,</li></ul>	158-160' Slow
160_ -117.6	160.0			smooth, undulating 157.0' - Fracture, 75 deg, rough, undulating	$\vdash$	cavities up to 1/8" present 152.05-154.2' - very light gray to light	advancement —
-			4	157.2, 157.4, 157.6, 157.8, 157.9, 158.0' -		olive gray, (N8 to 5Y 6/1), very fine	Lost circulation at 160.0'
_				Bedding plane (6), <10 deg, smooth,	H	grained, moderate to strong HCI	-
-			8	undulating 158.15, 158.3' - Bedding plane (2), smooth,       -	尸	reaction, weak to medium strong (R2 to R3), voids cover 0-30% of the	
_				undulating	口	surface increasing with depth,	
-	R20-NQ 5 ft	7	0	160.35' - Fracture, 20 deg, rough, undulating 160.65' - Bedding plane, horizontal, smooth,	$\vdash$	fossiliferous, bioturbation and secondary infill, iron staining rare	]
I _	44%	·		undulating	厈	No Recovery 154.2-155.0'	Very slow, continuous advancement -
			, _	160.85' - Fracture, 65 deg, rough, undulating 161.0' - Fracture, 15 deg, rough, undulating -	片	Limestone - 155.0-155.5' - dark yellowish brown	advancement
			NR	161.25' - Mechanical break, 45 deg, rough,	Н	to light olive gray, (10YR 4/2 to 5Y	1
_				undulating 161.25-161.5' - Fracture zone, rough,	Ш	5/2), very fine to fine grained, weak (R2), 10-20% organic laminations on	R20: 20 minutes
165	165.0			undulating, multiple intersecting fractures	Ш	bedding plane, fractures in poorly	1
-122.6	. 50.0			161.7' - Fracture, 15 deg, smooth, undulating	$\vdash$	competent seams and laminae	SC-4 collected at 165.2-
-			5	161.95' - Fracture, 65 deg, smooth, undulating	Ħ	<ul> <li>155.5-158.0' - dark yellowish brown to light olive gray, (10YR 4/2 to 5Y</li> </ul>	165.75' -
-				165.0-165.2' - Fracture zone, rough, stepped		5/2), very fine grained, mild to	
-			>10	to undulating 165.75-165.95' - Bedding plane, horizontal,	仠	moderate HCl reaction, weak (R2), voids cover 10-40% of the surface	-
-	R21-NQ		3	smooth, undulating	世	- voids cover 10-40 /0 of the surface	-
-	5 ft	12		165.95-166.65' - Fracture zone, smooth to	$\vdash$	-	-
-	48%			rough, undulating 166.85' - Fracture or mechanical break, 60	H	_	-
				deg, rough, stepped	H		
1			1				



PROJECT NUMBER:

33884.FL

BORING NUMBER:

E-08

SHEET 10 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722897.6 N, 458228.0 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, NQ tools, HW casing

				DIRECT COME SOUN SAN SAN SAN SAN SAN SAN SAN SAN SAN SA			ORIENTATION . Vertical
WATER	LEVELS : 4.4	-1 ft b	gs on :	3/06/07 START : 2/15/2007 END : 2/	23/20	D7 LOGGER: R. Gomez, R. Bitely, T LITHOLOGY	. Stewart COMMENTS
<b>≥</b> 5€	CORE RUN, LENGTH, AND RECOVERY (%)				99	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	Z'A'∑	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H B ATIC	J.H.	(%) <sub>Q</sub>		DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
무류	S S S S S S S S S S S S S S S S S S S	g	AAC ER F	PLANARITY, INFILLING MATERIAL AND	/ME	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	225	ď	표표	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	
			NR	166.95' - Fracture, horizontal, rough,	Ш	158.0-158.6' - very light gray to	
				undulating 167.1' - Fracture, vertical, rough, undulating	$\top$	<ul> <li>yellowish gray, (N8 to 5Y 8/1), moderate HCl reaction, weak to</li> </ul>	R21: 7 minutes
<sub></sub>				167.3' - Bedding plane, horizontal, smooth,	F	medium strong (R2 to R3), minor to	-
170 -127.6	170.0			undulating —	₽	— trace voids, minor iron staining on	_
-127.0			4	170.1' - Bedding plane, horizontal, smooth,		surface	_
				undulating, 1/2" open 170.6' - Fracture, 60 deg, rough, undulating		No Recovery 158.6-160.0' Limestone	
1 1				170.0 - Fractifie, 60 deg, rough, undulating 170.7' - Bedding plane, horizontal, rough,		160.0-162.2' - very light gray to light	1
			2	undulating	1	brownish gray, (N7 to 5YR 6/1), very	-
-	R22-NQ			171.0, 171.3, 171.85' - Fractures (3), 40 deg	+	<ul> <li>fine grained, moderate to strong HCl</li> </ul>	-
1 4	5 ft	38	8	and 30 deg, rough, undulating, <1/4" open		reaction, weak to medium strong (R2	_
	96%			172.15' - Bedding plane, horizontal, rough, undulating	$oldsymbol{+}$	to R3), voids cover 0-80% of surface, no voids at 160.4-160.65'	
				172.35-172.7' - Fracture zone, rough,		No Recovery 162.2-165.0'	
1 7			>10	undulating, intersecting fractures at varying	$\vdash$	Limestone	]
1 1			_	angles 173.05' - Fracture, 20 deg, rough, undulating		<ul><li>165.0-167.4' - very light gray to light olive gray, (N8 to 5Y 6/1), very fine</li></ul>	R22: 8 minutes
-			2	173.15-173.3' - Fracture zone, intersecting	₩	grained, moderate HCl reaction,	-
	175.0		NR.	fractures at varying angles	-	weak to medium strong (R2 to R3),	
-132.6			4	173.55, 173.75, 173.95, 174.3, 174.6' -	$\perp$	voids cover 30-60% of surface	_
			-	Bedding plane or fracture (5), <10 deg, rough to smooth, undulating, <1/2" open		No Recovery 167.4-170.0' Limestone	
				175.1' - Fracture, 70 deg, smooth, undulating		170.0-170.1' - Same as 165.0-167.4'	1
-			5	175.2, 175.5, 175.9, 176.05, 176.25, 176.35,	+	except few voids on surface	-
-	D00 NO			176.6, 176.8, 177.4, 177.65, 177.8' - Bedding		170.1-170.6' - moderate yellowish	-
	R23-NQ 5 ft	22	2	plane (11), <10 deg, smooth, undulating, <1/8" open to tight	₽	brown, (10YR 5/4), very fine to medium grained, mild to moderate	_
	56%			170 open to light		HCl reaction, weak to medium strong	
					Н	(R2 to R3), trace laminated bedding	
1 7			ا ـ ا		╁┼	with few infill features	1
-			NR		$\blacksquare$	170.6-174.8' - very light gray to light olive gray, (N8 to 5Y 6/1), very fine to	R23: 8 minutes
-					$\pm \top$	- medium grained, moderate HCl	
	180.0			_		reaction, weak to medium strong (R2	Core not retained in sample barrel; NQ tooling —
-137.6			10	180.1, 180.25, 180.6, 180.7, 180.85, 180.9' -	$\vdash$	to R3), voids cover 50-80% surface,  - cavities and dissolution features up	removed to retreive sample
			10	Bedding plane (6), <10 deg, rough,		to 1/4" cover 20% surface from	from core barrel
				undulating to stepped	╁	170.9-171.8', bedding plane	2.5' of slough or sand in - borehole from apparent
1 -					╁	<ul> <li>laminations at 178.6-178.9', contacts</li> </ul>	flow zone at 177.5'; hole
1 4					ш	from very fine to medium grained	cleaned out to 180.0'
	R24-NQ 5 ft	7				lithologies at 170.1', 170.6', and - 172.15-172.2'	_
	20%	•	ND			No Recovery 174.8-175.0'	
1 7			NR		$\vdash$	Limestone	]
1 -					口	<ul> <li>175.0-177.8' - very light gray to light olive gray, (N8 to 5Y 6/1), very fine to</li> </ul>	-
1 -					+	medium grained, moderate HCl	R24: 6 minutes
1 4						reaction, weak to medium strong (R2	Drill stem sand-locked at -
	185.0				$oldsymbol{oldsymbol{\sqcup}}$	to R3), voids cover 10-30% of	185.0'; back hammered 3
-142.6						surface, voids up to 1/2" rare No Recovery 177.8-180.0'	hours to free tooling
1 7					1	Limestone	Sand flow zone likely at 180.0-183.0'
1 +					1	180.0-181.0' - light olive gray, (5Y	
1 -					1	_ 6/1), very fine to fine grained,	-
				,	1	moderate HCl reaction, weak to medium strong (R2 to R3), voids	_
					]	cover 30% of surface, bedding plane	
1 7						laminations, trace fossils	]
1 1					1	No Recovery 181.0-185.0'	1
						Bottom of Boring at 185.0 ft bgs on	-
						2/23/2007	
							1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-01	SHEET	1	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724390.3 N, 457810.6 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

SAMPLE INTERVAL (ft)  RECOVERY (ft)  #TYPE 6"-6"-6" (N)  1.3 SS-1  1.5 SS-1  1.5 SS-1  1.5 SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  Topsoil  0.0-0.3' - very dusky red, (10R 2/2), moist, 20-30% fine to coarse rootlets  Poorly Graded Sand With Organics (SP) 0.3-1.3' - very light gray, (N8), moist, very loose, very fine to fine grained, trace nonplastic fines, 10% organics, decreasing with depth, silica sand  Topsoil 0.0-0.3' - very light gray, (N8), moist, very loose, very fine to fine grained, trace nonplastic fines, 10% organics, decreasing with depth, silica sand  Poorly Graded Sand With Silt (SP-SM) 5.0-5.9' - very pale orange, (10YR 8/2), wet, loose, very fine to fine silica sand, 10-15% nonplastic fines, trace very fine black particles, clayey sand in last 0.2' SS-2 is wet so wate	- - - - s -
SAMPLE INTERVAL (ft)  RECOVERY (ft)  #TYPE 6"-6"-6" (N)  1.3 SS-1  1.5 SS-1  1.5 SS-1  1.5 SS-2  1.5 SS-2  1.5 SS-2  1.5 SS-2  1.5 SS-2  1.5 SS-2  1.5 SS-2  1.5 SS-2  1.5 SS-2  1.5 SS-2  1.5 SS-2  1.5 SS-3 SS-2  1.5 SS-3 SS-2  1.5 SS-3 SS-2  1.5 SS-3 SS-2  1.5 SS-3 SS-2  1.5 SS-3 SS-2  1.5 SS-3 SS-2  1.5 SS-3 SS-3 SS-3 SS-3 SS-3 SS-3 SS-3 SS-	NG, DRILLING RATE, LOSS, TESTS, AND MENTATION  3:45  s - s -
Topsoil  1.3 SS-1  1.5  1.5  1.6  1.7  1.8  1.9  1.9  1.9  1.9  1.9  1.9  1.9	CLOSS, TESTS, AND MENTATION  3:45  s - sit
Topsoil  1.3 SS-1  1.5  1.5  1.6  1.7  1.8  1.9  1.9  1.9  1.9  1.9  1.9  1.9	CLOSS, TESTS, AND MENTATION  3:45  s - sit
Topsoil  1.3 SS-1  1.5  1.5  1.6  1.7  1.8  1.9  1.9  1.9  1.9  1.9  1.9  1.9	s -
Topsoil  1.3 SS-1  1.5  1.5  1.6  1.7  1.8  1.9  1.9  1.9  1.9  1.9  1.9  1.9	- - - - s - it
1.3 SS-1 2-2-2 (4)  1.5	- - - - s - it
1.5   1.3   SS-1   (4)   Vifine to coarse rootlets   Poorly Graded Sand With Organics (SP)   0.3-1.3' - very light gray, (N8), moist, very loose, very fine to fine grained, trace nonplastic fines, 10%   organics, decreasing with depth, silica sand   140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat   Added 1/8 52-lb bag mud vat   SS-2 collected at 09   SS-2   (6)   Very fine to fine silica sand, 10-15% nonplastic fines, trace very fine black particles, clayey sand in last 0.2'   SS-2 is wet so wate	it _
0.3-1.3' - very light gray, (N8), moist, very loose, very fine to fine grained, trace nonplastic fines, 10% organics, decreasing with depth, silica sand  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat	it _
fine to fine grained, trace nonplastic fines, 10% organics, decreasing with depth, silica sand  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat  140-lb hammer NW rod 5.0' section 4.75" tricone roller by Added 1/8 52-lb bag mud vat	it _
language   language	it _
4.75" tricone roller by Added 1/8 52-lb bag mud vat  SS-2 collected at 09 very fine to fine silica sand, 10-15% nonplastic fines, trace very fine black particles, clayey sand in last 0.2'  4.75" tricone roller by Added 1/8 52-lb bag mud vat  SS-2 collected at 09 very fine to fine silica sand, 10-15% nonplastic fines, trace very fine black particles, clayey sand in last 0.2'  SS-2 is wet so wate	it _
Added 1/8 52-lb bac mud vat  SS-2 collected at 09  SS-2 (6)  Poorly Graded Sand With Silt (SP-SM)  5.0-5.9' - very pale orange, (10YR 8/2), wet, loose, very fine to fine silica sand, 10-15% nonplastic fines, trace very fine black particles, clayey sand in last 0.2'  SS-2 is wet so wate	
SS-2 collected at 09    SS-2   2-3-3	- -
38.1  Output	-
38.1  Output	<u>l</u>
38.1  Output	7
0.9 SS-2 2-3-3 (6) 5.0-5.9' - very pale orange, (10YR 8/2), wet, loose, very fine to fine silica sand, 10-15% nonplastic fines, trace very fine black particles, clayey sand in last 0.2' SS-2 is wet so wate	ı:07
very fine to fine silica sand, 10-15% nonplastic fines, trace very fine black particles, clayey sand in last 0.2'	
\ofeanof sample  \dag{-1} \dag{bgs}	r level is placed at 3.0"
	7
	=
	-
	7
10 10.0	ı:1 <i>4</i>
7-8-7 10.0-11.0' - very pale orange, (10YR 8/2), wet,	- 17
1.0   55-3   (15)   medium dense, fine silica sand, 5% nonplastic fines,	-
trace very fine black particles	-
	_
	7
]	†
	+
1 45 1 45 1 1 1 1 1 1 1	+
15 15.0   Silty Sand (SM)   SS-4 collected at 09	r23
0.9 SS-4 (20) medium dense, fine silica sand, 20% nonplastic fines, trace very fine black particles	-
16.5 \ \text{Trace very line black particles}	_
	_
] ]   ] ] ]	7
] ]   ] ] ]	7
	†
	†
20	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-01	SHEET	2	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724390.3 N, 457810.6 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	NATER LEVELS: 4.5 ft bgs on 4/5/2007 START: 4/4/2007 END: 4/5/2007 LOGGER: T. Stewart									
~				STANDARD	SOIL DESCRIPTION		<sub>ق</sub>	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LISCS CROUD SYMBOL COLOR		olo C	DEPTH OF CASING, DRILLING RATE,		
H BE ATIC		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	SYMBOLIC LOG		DRILLING FLUID LOSS, TESTS, AND		
SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	2	SYM	INSTRUMENTATION		
23.1	20.0			( )	Silty Sand (SM)	T	П	SS-5 collected at 09:32		
-		1.0	SS-5	11-19-24 (43)	20.0-21.0' - Same as 15.0-15.9' except dense	1		_		
	21.5			(10)		T				
_						1		_		
-						1		-		
-						-		-		
_						+		-		
-						+		-		
25	25.0					1		-		
18.1	20.0				Silty Sand (SM)		П	SS-6 collected at 09:47		
		1.1	SS-6	20-35-50 (85)	25.0-26.1' - Same as 20.0-21.0' except very dense					
	26.5			()		Ť	٦	_		
_						1		-		
_						-		-		
-						+		-		
-						+		-		
-						1		-		
30	30.0					1		-		
13.1				23-48-50/4	Silty Sand (SM)			SS-7 collected at 10:08		
_	24.0	1.3	SS-7	(98/10")	30.0-31.3' - pale yellowish orange, (10YR 6/2), wet, very dense, fine silica sand, 20% nonplastic fines,			-		
-	31.3				trace very fine black particles, 5% medium to coarse sand-sized concretions in the upper 0.3' of sample	╬	Ш	-		
-						+		-		
-						+		-		
-						1		-		
-						1		-		
						]				
35	35.0				Oilfo Oand (OM)					
8.1		4.5	00.0	24-43-50	Silty Sand (SM) 35.0-36.3' - pale yellowish orange, (10YR 6/2), wet,	4		SS-8 collected at 10:22		
-		1.3	SS-8	(93)	very dense, fine silica sand, 20% nonplastic fines,  5-10% very fine black particles, trace medium	1		-		
-	36.5				grain-sized concretions, trace organics	1		-		
-						1		-		
1 -						1		-		
						]		_		
-						1				
-						-		-		
40						+	+			



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-01	SHEET	3	OF	6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724390.3 N, 457810.6 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS	: 4.5 ft b	gs on 4/5/	2007 5	START : 4/4/2007 END : 4/5/2007 LOGG	ER:	Т.	Stewart
				STANDARD	SOIL DESCRIPTION		G	COMMENTS
LOW AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLIC LOG		
H H H		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		YMB	INSTRUMENTATION
3.1	40.0			(N)	Silty Sand (SM)	$\dashv$	() 	SS-9 collected at 10:38
-		1.0	SS-9	30-50/6 (80/12")	40.0-41.0' - palé yellowish brown, (10YR 5/4), wet,	-[]		
-	41.0			, ,	very dense, fine silica sand, 15-20% nonplastic fines, trace very fine black particles	╱╬	.11.	
-						1		
-						+		
-						1		
-						1		
-						1		
-						1		
45	45.0					1		
-1.9	70.0	0.0	00.40	34-50/4.5	Silty Sand (SM)	1	П	SS-10 collected at 10:57
-	45.9	0.9	SS-10	(84/10.5")	45.0-45.9' - Same as 40.0-41.0' except very pale orange, (10YR 5/4), wet, very dense, dark yellowish			
-					orange (10YR 6/6) mottling in upper portion of			
_					sample, sample grades to pale yellowish brown (10YR 6/2) from 45.5-46.1', fine silica sand, 15-20%	/1		Driller's Remark: 11:05 added 1/2 50-lb bag
					\nonplastic fines, trace very fine to medium black	/1		of QuikGel bentonite after removing sand cuttings from tub and refilling with clean
					particles, trace medium sand-sized concretions, similar to above	1		water; maintained circulation since start
						]		
						]		
_						]		
50	50.0							_
-6.9				20 44 50	Silty Sand (SM) 50.0-51.2' - light olive gray, (5Y 5/2), wet, very dense,			SS-11 collected at 11:35
_		1.2	SS-11	28-44-50 (94)	fine silica sand, 20-25% nonplastic fines, trace very			
_	51.5				fine black particles	寸	ш	
_						4		
_						4		
-						4		
_						4		
-						4		
-						+		
55 <u> </u>	55.0				Silty Sand (SM)	+		SS-12 collected at 13:54
		1.2	SS-12	22-34-44	55.0-56.2' - Same as 50.0-51.2' except trace coarse	-[1]		
-	FC -	1.2	33-12	(78)	sand-sized concretions over first 0.1' (slough)	-	Ш	
-	56.5					+		
-						+		
-						+		
-						1		
-						1		
-						1		
60						1		
						十		
		1						



PROJECT NUMBER:	BORING NUMBER:	
338884 FI	GSC-01	SHEET 4 OF 6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724390.3 N, 457810.6 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-3/4" tri-cone bit

<u>DRILLING METHOD AND EQUIPMENT</u> . CME 550 5/N 166073, INIUd totary, cathead, NW 1005, 4-5/4 til-cone bit  WATER LEVELS: 4.5 ft bgs on 4/5/2007 START: 4/4/2007 END: 4/5/2007 LOGGER: T. Stewart									
WATER	LEVELS	: 4.5 ft bo	ıs on 4/5/		START : 4/4/2007	END : 4/5/2007	LOGGEF	( : [. ]	
≥∩≎	SAMPLE INTERVAL (#) STANDARD PENETRATION SOIL DESCRIPTION						ღ	COMMENTS	
O N N	SAMPLE	INTERVA	L (ft)	TEST RESULTS	0011 11414	45 LIGOO ODOLID OVA 4DOL (	201.00	) LC	DEDTIL OF CACING DRILLING DATE
DEPTH BELOW SURFACE AND ELEVATION (#)		RECOVE	RY (ft)		MOISTURE	1E, USCS GROUP SYMBOL, O E CONTENT, RELATIVE DENS	SITY OR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
F A Y			#TYPE	6"-6"-6"		ICY, SOIL STRUCTURE, MINE		MB	INSTRUMENTATION
SC EL				(N)				Sγ	
-16.9	60.0				Silty Sand (SN	M)			SS-13 collected at 14:13
-		1.2	SS-13	25-43-50	90.0-61.2 - Sa	ame as 55.0-56.2' except no ages from yellowish gray (5Y	concretions -		1
-	04.5			(93)	upper 0.25' to	light olive gray (5Y 5/2) from	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		1
-	61.5				\60.25-61.2'		/ -	1	-
-							-	1	-
-							-		-
l _							_		_
							_		
-							-		1
	05.0						-		-
65 -21.9	65.0			22 50/4 5	Silty Sand (SN	M)			SS-14 collected at 14:39
-	05.0	0.9	SS-14	32-50/4.5 (82/10.5")	65.0-65.9' - ligh	ht olive gray, (5Y 5/2), wet, v d, 15-20% nonplastic fines, t	ery dense, -		-
-	65.9			(02.10.0)	fine silica sand	d, 15-20% nonplastic fines, t	race very	Ш	-
l _					fine black parti	icies			_
_							_		
-							-		1
-							-		-
-							-	1	-
-							-	1	-
-							-		_
70	70.0								_
-26.9		0.9	SS-15	35-50/6	Silty Sand (SN	<b>/l)</b> llowish gray, (5Y 7/2), wet, v	on, donos		SS-15 collected at 15:00
1 -	71.0	0.9	33-13	(85/12")		d, 15-20% nonplastic fines, t			
-					\fine black parti				Added water and 1/4 bag QuikGel bentonite
-							-	1	1
-							-	1	-
-							-	-	-
-							-		-
_							-		_
							_		1
75	75.0						-	1	1
-31.9	, 5.0			33-50/5	Silty Sand (SN			Ш	SS-16 collected at 15:25
-	75.9	0.8	SS-16	(83/11")		me as 70.0-70.9'	-		-
-	70.0								
-							-		-
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80									



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-01	SHEET	5	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724390.3 N, 457810.6 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	VATER LEVELS: 4.5 ft bgs on 4/5/2007 START: 4/4/2007 END: 4/5/2007 LOGGER: T. Stewart									
				STANDARD	SOIL DESCRIPTION	υ	COMMENTS			
AND AND	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISOS CROUD SYMBOL COLOR	SYMBOLIC LOG	DEDTH OF CASING DOWNING DATE			
H BE ACE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	S S	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYM	INSTRUMENTATION			
-36.9	80.0				Silty Sand (SM)	Ш	SS-17 collected at 15:50			
-		1.4	SS-17	18-32-44 (76)	80.0-81.4 - yellowish gray, (5Y 7/2), wet, very dense, grayish blue (5PB 5/2) mottling/staining of sand from	111	1			
	81.5			(10)	80.7-81.0', medium light gray (N6) staining from ∖ 81.0-81.4', fine silica sand, 20-25% nonplastic fines,		Added 1/4 50-lb bag of QuikGel bentonite			
					trace very fine black particles		]			
-						1	_			
_						4	_			
-						1	-			
-						$\mathbf{I}$	-			
85	85.0					1	-			
-41.9	65.0				Silty Sand (SM)		SS-18 collected at 16:15			
-		1.1	SS-18	15-12-12 (24)	85.0-86.1' - Same as 80.0-81.4' except medium dense, 1" thick grayish blue seam near the top and	1111	1			
	86.5			(24)	very bottom of sample, 25-30% nonplastic fines		]			
-						1	_			
-						-	-			
-						-	-			
-						┨	-			
90	90.0					1	-			
-46.9	90.0				Silty Sand (SM)	111	SS-19 collected at 16:39			
-		1.3	SS-19	11-11-10 (21)	90.0-91.3' - grayish yellow, (5Y 8/4), wet, medium dense, very fine to fine silica sand, 20-25% nonplastic	1111	1			
	91.5			(21)	fines, trace very fine sand-sized black particles, 1/2" thick seam of medium dark gray to dark gray (N4 to					
_					\N3) sand at 90.3' with 1/4"-3/8" subrounded	1	_			
_					gravel-sized sand concretions, possible pyrite	4	_			
-						4	-			
-						1	-			
-						1	-			
95	95.0					1	-			
-51.9	55.0				Silty Sand (SM)		1			
_		0.7	SS-20	6-7-8 (15)			SS-20 collected at 17:05			
	96.5			(.0)	trace fine sand-sized angular black particles, 1"	]	]			
_					Section with a monored out occurry					
-						-				
-						-	-			
-						1	-			
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100						1				
100						T				
						1				



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-01	SHEET	6	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724390.3 N, 457810.6 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-3/4" tri-cone bit

WATER	LEVELS	: 4.5 ft b	gs on 4/5/	2007 5	START : 4/4/2007	END : 4/5/2007	LOGGE	R : T	. Stewart
300				STANDARD		SOIL DESCRIPTION			COMMENTS
ANE (#)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS	COUL NIAME	E LIGOR ODOLID OVANDO		070	DEDTIL OF CACING DOULING DATE
H BE ACE ATIO		RECOVE	ERY (ft)		MOISTURE	E, USCS GROUP SYMBO CONTENT, RELATIVE D	ENSITY OR	300	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTEN	CY, SOIL STRUCTURE, M	IINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
-56.9	100.0			(14)	Silty Sand (SM	1)		1	SS-21 collected at 17:39
-		1.5	SS-21	10-24-49	100.0-101.5' - S	Śame as 90.0-91.2' exce e angular dark gray (N3)	ept very dense,	11	18:03 Driller tape measures hole
-	101.5			(73)	no seams, tract	e aligulal dalk gray (No	Concretions	-	Total depth at 97.0' Water level at 4.5' below ground surface
-	101.5				Bottom of Borin	ng at 101.5 ft bgs on 4/5/	2007	111	4/05/07 07:36
-								1	Water level at 3.5' bgs Grouted to surface with three 92 lb bags of
-								1	Holcim brand Portland cement and two 47-lb
-								1	bags of Quikrete brand Portland cement
-								1	-
-								1	-
105								1	-
-61.9							<del>-</del>		_
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110 <u></u> -66.9							-	4	_
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-71.9							-	1	_
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-01A SHEET 1 OF 6

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724368.5 N, 457807.6 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS	: 3.0 ft bo	gs on 4/6/	07 5	START : 4/5/2007	
				STANDARD	SOIL DESCRIPTION 0	COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LICCO OPOUR OVARDOL COLOR	CACINO DDILLINO DATE
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING	CASING, DRILLING RATE, FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	STRUMENTATION
42.9	0.0			(14)	Poorly Graded Sand With Organics (SP) SS-1 collected	I at 10:12
-	1	1.5	SS-1	1-2-2	0.0-1.0' - very light gray, (N8), moist, very loose, very fine to fine grained silica sand, trace nonplastic fines,	-
-	1.5			(4)	15% organics Glen Davis is	cathead operator
-					Sandy Organic Soil (OL) 1.0-1.5' - brownish black and medium brown, (5YR 140-lb hamme	er –
-					\ \3/1. 5YR 3/4), moist, soft, low plasticity, 30-40\% very \ \ \ \ 24" split spoor	n (SS)
					fine silica sand, roots 5.0' sections of	of NW rod
					4.75" tricone r	oller drill bit
					1/2 50-lb bag mud vat	QuikGel bentonite added to
_					_ Indu vat	_
5	5.0					
37.9				3-6-8	Clayey Sand (SC) 5.0-5.5' - yellowish gray, (5Y 7/2), wet, medium dense,	l at 10:39 -
-		0.9	SS-2	(14)	_∖ no HCl reaction, very fine to fine silica sand, 30% low /	-
-	6.5				\\plastic fines, 10-15% rootlets \\\Poorly Graded Sand (SP)	-
-	-				\5.5-5.9' - very pale orangé, (6YR 8/2), wet, medium	-
-	-				dense, fine silica sand, trace nonplastic fines	-
-					- 1	-
-	-				- 1	-
-						-
-						-
10 <u> </u>	10.0				Silty Sand (SM) SS-3 collected	
-		1.3	SS-3	6-7-9	10.0-11.3' - light olive gray, (5Y 6/1), wet, medium -	-
-	11.5	1.0		(16)	dense, fine silica sand, 30-35% nonplastic fines, trace very fine black particles	-
-	11.5				1	-
-	1				1	-
-	1				1	-
-					1	-
1 -	1				1	-
1 -	]				1	-
15	15.0					-
27.9				0.40.40	Silty Sand (SM) 15.0-16.1' - Same as 10.0-11.3' except very pale	I at 10:52
		1.1	SS-4	8-10-13 (23)	orange, (10YR 8/2), 25% nonplastic fines	_
_	16.5			\ - /		_
-					]	-
-	1				] ]	-
-					] ]	-
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20						



PROJECT NUMBER:	BORING NUMBER:
338884.FL	GSC-01A

SHEET 2 OF 6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724368.5 N, 457807.6 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

						END: 4/6/2007			
WATER	LEVELS	. J.U II DO	gs on 4/6/		START : 4/5/2007	END: 4/6/2007 SOIL DESCRIPTION	LOGGEF		Stewart COMMENTS
≩Q∉	04451	INITED	1 (6)	STANDARD PENETRATION	<b></b>	GOIL DEGUNIF HON		90	CONTINUENTO
ELC ON (	SAMPLE	INTERVA	. ,	TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBO	L, COLOR.	IC L	DEPTH OF CASING, DRILLING RATE,
H B		RECOVE	<u> </u>		MOISTURI	E CONTENT, RELATIVE DE	ENSITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTEN	NCY, SOIL STRUCTURE, M	INERALOGY	SYMBOLIC LOG	INSTRUMENTATION
22.9	20.0			(11)	Silty Sand (SI	M)		TTT	SS-5 collected at 11:00
-		1.1	SS-5	16-22-31	20.0-21.1' - Sa	ame as 15.0-16.1' except	very dense, -		-
-		'.'	33-3	(53)	slight nue cha	inge at bottom 4" toward p 6/2), 20-25% nonplastic fi	ale yellowish nes	Ш	-
-	21.5				(3.3 (1.3.1.1	<u> </u>	-		-
-							-		-
_							-		-
_							=		_
_							-		_
_							_		_
_							_		_
25	25.0								
17.9				00.00	Silty Sand (SI	<b>M)</b> ame as 15.0-16.1' except	veny nale -		SS-6 collected at 11:07
I -		1.2	SS-6	20-38-55 (93)	orange to pale	e yellowish brown, (10YR	3/2 to 10YR		
	26.5			(00)	6/2), 20% high	n plasticity fines			
_							-		_
_							-		_
_							-	1	_
_							-		
-							-		-
-							-		-
	20.0						-		-
30 <u> </u>	30.0				Silty Sand (SI	M)			SS-7 collected at 11:17
-		1.2	SS-7	21-31-41	30.0-31.2' - Sa	ame as 25.0-26.2' except			-
-		'.2	00-7	(72)		ale yellowish orange (10YF e coarse sand-sized conc			-
-	31.5				(1-1-1-1)				-
-							-		-
-							-		-
-							-		-
_							-		_
-							-		_
-							-		_
35	35.0							1,111	_
7.9				12-18-20	Silty Sand (SI 35 0-36 5' - pa	<b>M)</b> ale yellowish brown, (10YF	R 6/2) wet -		SS-8 collected at 11:26
_		1.5	SS-8	(38)	dense, fine sili	ica sand, 30-35% nonplas	stic fines, black		
	36.5			,	(N1) mottling of	of sands in a 1/4" thick se ve (30.0-31.2')	am at 35.75',	Ш	
					Similar to about	vo (00.0-01.2 <i>)</i>			
							_		Driller's Remark: 12:50 empty mud vat,
1 -							-		remove sandy cuttings, refill, add 1/4 50-lb – bag of QuikGel bentonite
-							-		13:15 Resume drilling to 40.0'
_							-	1	1
-							-		-
40							-		-
<b>—</b>									



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-01A SHEET 3 OF 6

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724368.5 N, 457807.6 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS	: 3.0 ft bo	gs on 4/6/	07 5	START : 4/5/2007 END : 4/6/2007 LOGG	GER	: T. \$	Stewart
300				STANDARD	SOIL DESCRIPTION		G	COMMENTS
AND (f	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISCS CROLID SYMPOL COLOR		СГО	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
2.9	40.0			( )	Silty Sand (SM)	_	П	SS-9 collected at 13:24
-	1	1.2	SS-9	16-21-19 (40)	40.0-41.2' - Same as 35.0-36.5' except random mottling of a grayish black to black sand in 1/8"-1/4"	1		<del>-</del>
-	41.5			(40)	seams	$\nearrow 1$	Ш	_
						]		
-								_
_						4		<u>-</u>
_						4		<u>-</u>
-						4		-
-								-
45 -2.1	45.0				Silty Sand (SM)	-	1147	SS-10 collected at 13:36
	-	1.2	SS-10	15-18-19	45.0-46.2' - pale yellowish brown, (10YR 6/2), wet,	Ⅎ		-
-	40.5	1.2	33-10	(37)	dense, fine silica sand, 30% low plasticity fines, no mottling, sample relatively homogenous	4	Ш	-
-	46.5					´ {		Driller's Remark: Change out rope on
-	1					1		hammer after noticing a weakened/frayed – zone in it
-	1					1		
-						1		_
						]		_
						]		
50	50.0						,	
-7.1 -				5-6-9	Fat Clay (CH) 50.0-51.5' - predominantly dusky yellow green, (5GY	4		SS-11 collected at 14:00
-		1.5	SS-11	(15)	5/2), moist, stiff, high plasticity, no dilatancy, mottled with dusky blue and very pale orange (5PB 3/2, 10YR	-[		<del>-</del>
-	51.5				8/2), various clasts throughout sample including: trace			_
-	-				flat, rounded coarse sand to fine gravel-sized clasts, 5% concretions near bottom of sample, trace medium	/-		-
-					sand-sized angular shaped black particles, trace rounded clasts to 1/8", low to mild HCl reaction on	/-		-
-					very pale orange clasts			-
-						1		-
-	1					1		-
55	55.0					1		_
-12.1					Sandy Fat Clay (CH) 55.0-56.5' - predominantly yellowish gray, (5Y 7/2),			SS-12 collected at 14:22
		1.5	SS-12	4-5-5 (10)	moist, stiff, high plasticity, no dilatancy, mottled with			_
_	56.5			,	dark gray and grayish green (N3 and 10GY 5/2), 25-30% very fine silica sand in irregular lenses, trace			<u>-</u>
-	1				∖ to 5% fine carbonate sand, mild HCl reaction in			<u>-</u>
_	-				\carbonate particles	<sup>/</sup>		_
-	-					4		-
-	-					-		-
-	-					$\exists$		-
-	1					-		-
60						$\dashv$		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-01A	SHEET	4	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724368.5 N, 457807.6 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS	: 3.0 ft bo	as on 4/6/	07 5	START : 4/5/2007
300				STANDARD	SOIL DESCRIPTION g COMMENTS
N (# ON	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR  DRILLING FAUL LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
-17.1	60.0				Fat Clay With Sand (CH) SS-13 collected at 14:53
-	1	1.5	SS-13	3-5-5 (10)	60.0-61.5' - Same as 55.0-56.5' except no dark gray mottling, 10% very fine silica sand and 10-15%
	61.5			(1-7)	medium sand-sized very pale orange (10YR 8/2) carbonate particles throughout, mild HCl reaction in
_					\_\text{carbonates}
-					
-	-				
-	-				
-	-				<u> </u>
65	65.0				
-22.1	00.0				Fat Clay (CH) SS-14 collected at 15:25
		1.5	SS-14	3-5-7 (12)	65.0-66.5' - grayish green, (10GY 5/2), moist, stiff, high plasticity, no dilatancy, no HCl reaction, mottled
_	66.5				with pale yellowish green (10GY 7/2) throughout, 1/2"-3/4" pocket of a white fat clay with 5-10% fine to
_					medium sand-sized particles    Driller's Remark: Will switch to a 3-7/8" drag bit to help drilling rate through clay
-	-				_ Driller's Remark: NW rod (5 sections)
-					
-					
-	-				
70	70.0				
-27.1	7 0.0				Fat Clay (CH) SS-15 collected at 16:10
		1.5	SS-15	5-8-10 (18)	70.0-71.5' - pale blue, (5B 6/2), moist, very stiff, high plasticity, no dilatancy, no HCl reaction, trace mottling
_	71.5			. ,	with yellowish gray (5Y 8/1), trace yellowish gray medium sand-sized particles, fine gravel-sized pyrite
-					\at 70.2', silty sand (SM) seam in bottom 1-3/16" of \sample
-	-				Jampie -
-					-
-	-				
-	1				1
75_	75.0				
-32.1				40.04.00	Silty Sand (SM) 75.0-76.4' - pale yellowish brown, (10YR 6/2), wet,
_		1.4	SS-16	19-21-23 (44)	dense, no HCl reaction, fine silica sand, 20-30%
-	76.5				nonplastic fines, trace very fine sand-sized black particles
-	-				
-	-				
-	-				
-	†				1 1
-	1				1
80					
1	1				1 1



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-01A	SHEET	5	OF	6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724368.5 N, 457807.6 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

						END: 4/6/2007			
WATER	LEVELS	: 3.0 ft bo	15 UH 4/0/		START : 4/5/2007	END : 4/6/2007 SOIL DESCRIPTION	LUGGE	<u>                                      </u>	. Stewart COMMENTS
종무윤	SAMDIE	INTERVA	I (ft)	STANDARD PENETRATION		JOIL DESCRIPTION		8	COMMENTO
SELC ON	SAMPLL	RECOVE	• •	TEST RESULTS		ME, USCS GROUP SYMBOL		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
TH E		RECOVE		011 011 011		E CONTENT, RELATIVE DE NCY, SOIL STRUCTURE, MII		l l	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	0011010121	VOT, COIL OTROCTORE, WIII	VEI VIEOGI	SYN	INGINGINIENTATION
-37.1	80.0				Silty Sand (SI	M)		T	SS-17 collected at 17:01
-		1.2	SS-17	24-41-50 (91)	fine silica san	edium dark gray, (N4), wet ds, trace very fine black pa	, very dense, rticles. 20%	111	-
-	81.5			(31)	¬ nonplastic fine	es, first 4-13/16" of sample	is irregularly ,	711	-
-						and (SM) from 75.0-76.4' a /8" sand is as described ab		1	1
-							,	1	1
-								1	1
								1	1
-								1	1
-								1	1
85	85.0							1	1
-42.1					Silty Sand (SI		2(0)	TI	SS-18 collected at 17:28
-		1.2	SS-18	26-48-50/5.5 (98/11.5")		ale yellowish brown, (10YR nedium dark gray (N4) stair		111	1
-	86.5			(96/11.5 )		5-30% nonplastic fines, trac	ce medium	711	4
-	00.0				\sand-sized co	ncretions	/	1	Driller's Remark: 04/05/07 Stop drilling for
-								1	the day at 17:34
-								1	1
-								1	1
-								1	1
-								1	1
90	90.0							1	1
-47.1	00.0				Silty Sand (SI			11	SS-19 taken at 09:24
-		1.5	SS-19	14-9-9 (18)		ale yellowish brown, (10YR e, fine silica sand, 30-40%		111	1
	91.5			(18)	fines including	7-10% very fine sand-size	ed black	1	1
-						e medium dark gray (N4) s ravel-sized pyrite at top of		1	Driller's Remark: Glen Davis is cathead
					(possibly slough	gh)		1	operator on 04/06/07 N-rod (5.0' sections NW)
								1	3-7/8" drag bit
								1	140-lb cathead hammer
								1	50-lb bags of QuikGel brand bentonite in use
								1	08:15 water level at 3.0' below ground
95	95.0							1	surface – 08:50 pump not circulating
-52.1					Silty Sand (SI	M)	0(0)	T	(Rods/pump?) Clogged with sand
		1.5	SS-20	15-8-7 (15)	95.0-96.5' - pa medium dense	ale yellowish brown, (10YR e, fine silica sand, 25% low	o/∠), wet, plastic fines.		Rods broke out, cleared, re-assembled
	96.5			(13)		sand-sized black particles		1  -	Mud vat mixed 1/2 bag bentonite for drilling
	-							T	7 1
								1	1
								1	1
								1	Driller's Remark: 09:35 sand clogs rods
								1	again during installation into borehole -
								1	1
100								1	1
								T	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-01A	SHEET	6	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724368.5 N, 457807.6 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	WATER LEVELS : 3.0 ft bgs on 4/6/07									
				STANDARD	SOIL DESCRIPTION	G	COMMENTS			
LOW AND (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		Ω̈́				
A BE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30LIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION			
<u>-57.1</u>	100.0			(11)	Silty Sand (SM)	Ш	SS-21 collected at 10:46			
-		1.2	SS-21	3-4-3	100.0-101.2' - pale yellowish brown, (10YR 6/2), wet, very loose, fine silica sand, 20% nonplastic fines,		Driller's Remark: Circulation has been			
-	101.5		00 2.	(7)	trace fine to coarse gravel-sized pyrite	Ш	maintained at all times during drilling, No casing was installed			
-	101.5				Bottom of Boring at 101.5 ft bgs on 4/6/2007		10:46 End of drilling for GSC-01A (20.0)			
_					-		offset for sand delineation from GSC-01)			
-					_	1	1			
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105 -62.1							_			
-02.1					-		-			
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110										
-67.1					_		_			
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-72.1					_		_			
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-01B	SHEET	1	OF	6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724347.3 N, 457805.5 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS	: 3.0 ft bo	gs on 03/1	10/07	START : 4/6/2007 END : 4/9/2007 LOGGER	R : T.	Stewart		
		STANDARD SOIL DESCRIPTION				<sub>0</sub>	COMMENTS		
A P P P P P P P P P P P P P P P P P P P	SAMPLE	SAMPLE INTERVAL (ft) PENETRATION TEST RESULTS						SLO	DEDTIL OF GLOBIC DRIVING DATE
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND		
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION		
42.8	0.0			(14)	Poorly Graded Sand (SP)	°	SS-1 taken at 15:26		
-		1.3	SS-1	1-2-2	0.0-1.3' - very light gray, (N8), moist, very loose, very fine to fine silica sand, 5% nonplastic fines, trace very		-		
-	1.5			(4)	fine sand-sized black particles, trace organics and		24" split spoon (SS)		
-	1.0				brown mottling / -	1	50-lb bags of QuikGel brand bentonite - Added 1/4 bag bentonite to full mud vat		
-					_	1			
_					_		_		
_					<u>-</u>				
-					-	l	Water level at 3.0' below ground surface at 15:35 based on moist SS-1, wet SS-2		
5 37.8	5.0				Poorly Graded Sand (SP)		samples SS-2 taken at 15:49		
-		0.9	SS-2	7-9-8	5.0-5.9' - yellowish gray, (5Y 8/1), wet, medium dense, -				
-		0.9	33-2	(17)	fine grained, silica sand, trace nonplastic fines including trace sand-sized black particles		-		
-	6.5					ł	-		
-					-	1	-		
-					<del>-</del>	1			
-					_	1	_		
							]		
_					_		_		
10 32.8	10.0				Oile O and (OM)	11.11	00.04-1/		
32.8				8-11-12	Silty Sand (SM) 10.0-11.3' - very light gray to yellowish gray, (N8 to 5Y - 8/1), wet, medium dense, fine grained, low plasticity,		SS-3 taken at 15:54 -		
-		1.3	SS-3	(23)	8/1), wet, medium dense, fine grained, low plasticity, silica sand, 25-35% low plastic fines including trace		-		
-	11.5				\ very fine sand-sized black particles, trace fine /-	1	-		
-					\gravel-sized concretions \	ł	-		
-					<del>-</del>	ł	-		
-					-	1	-		
-					-	1	-		
					-	]	_		
15	15.0								
27.8				12-15-13	Silty Sand (SM) 15.0-16.2' - very light gray to yellowish gray, (N8 to 5Y -	$\ \ $	SS-4 taken at 15:59		
-		1.2	SS-4	(28)	8/1), wet, medium dense, fine grained, nonplastic,		_		
-	16.5				silica sand, 20-25% nonplastic fines, trace very fine grain black particles	<b>1</b> '''	-		
-						-	-		
-					-	1	-		
-					-	1	-		
-					-	1	-		
-					-	1	-		
20					-	1	1		
1						I			



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-01B

SHEET 2 OF 6

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724347.3 N, 457805.5 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	LEVELS	: 3.0 ft bo	gs on 03/	10/07	START : 4/6/2007 END : 4/9/2007 LOGGEF	R : T	. Stewart			
>00				STANDARD	SOIL DESCRIPTION	وِ	COMMENTS			
A NO NO NO NO NO NO NO NO NO NO NO NO NO	SAMPLE		INTERVAL (ft)  PECOVERY (ft)  PECOVERY (ft)  PENETRATION TEST RESULTS  SOIL NAME, USCS GROUP SYMBOL, COLOR,				DEPTH OF CASING, DRILLING RATE,			
TH BE		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR	BOLI	DRILLING FAILE, DRILLING FAILE			
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION			
22.8	20.0			. ,	Silty Sand (SM)	П	SS-5 taken at 16:04			
_		1.1	SS-5	12-15-14 (29)	20.0-21.1' - Same as 15.0-16.2' -	1	1			
	21.5			(23)						
							]			
_					-		_			
_					-		1			
_					-	┨	-			
-					-	┨	-			
	05.0				-	1	-			
25 <u> </u>	25.0				Silty Sand (SM)	П				
-		1.0	SS-6	12-75-72	25.0-26.0' - Same as 20.0-21.1'	1	-			
-	26.5			(147)		T	1			
							]			
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_					-	-	1			
-					-	┨	-			
					-	┨	-			
30 <u> </u>	30.0				Fat Clay (CH)	//	SS-7 taken at 16:21			
-		1.5	SS-7	5-7-6	30.0-31.5' - mixed CH materials in irregular lenses and pockets, 30.0-30.4' is grayish green (10GY 5/2),		1			
-	31.5			(13)	with medium gray to dark gray mottling (N3 to N4),		1			
_	01.0				30.4-31.1' is very pale orange (10YR 8/2), 31.1-31.5' is grayish green (10GY 5/2) with very pale orange		1			
					mottling (10YR 8/2), moist to wet (30.4-31.1'), stiff, high plasticity, no HCl reaction, trace medium					
_					sand-sized very pale orange (10YR 8/2) and dark gray					
_					(N1) clasts	-				
-					-	-	Driller's Remark: change to tricone roller bit			
					-	$\mathbf{I}$	3-7/8" at 34.0', hit hard rock			
35 7.8	35.0				Clayey Limestone Gravel With Sand (GC)		SS-8 taken at 16:44			
-		0.8	SS-8	15-13-13	35.0-35.8' - yellowish gray with light olive gray  ¬ staining, (5Y 8/1 with 5Y 5/6), wet, medium dense, г		₫ -			
-	36.5			(26)	\ strong HCl reaction, angular gravel-sized limestone,	1	1			
-					\20-25% fine to coarse sand-sized, 20% medium to high plastic fines, carbonate materials	1	1			
] -						1	]			
-					-	-				
-					<u>-</u>	-	-			
-					-	-	-			
40						╁	-			
							<u> </u>			



PROJECT NUMBER:	BORING NUMBER:
338884.FL	GSC-01B

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724347.3 N, 457805.5 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

ORIENTATION · Vertical

SHEET 3 OF 6

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION : Vertical										
WATER	WATER LEVELS : 3.0 ft bgs on 03/10/07									
		STANDARD SOIL DESCRIPTION				╛	ی	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	NTERVAL (ft) PENETRATION TEST RESULTS			1	SYMBOLIC LOG			
1 BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	1	5	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND		
TPT-			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	1	ΥMB	INSTRUMENTATION		
SE				(N)						
2.8	40.0			11-8-9	Clayey Sand (SC)	Æ	<u> </u>	SS-9 taken at 16:54		
_		0.4	SS-9	(17)	\ moist, medium dense, fine to medium grained, low to \	4	١	_		
_	41.5				medium plasticity, very strong HCl reaction, 25% low to medium plastic fines, carbonate materials	1	١	_		
_						1	١			
_						1	١	Driller's Remark: 17:02 43.5' hard drilling, loss of circulation (LOC) up to 100%		
_						1	١	- 1000 of the constitution (20 of the 100 of		
						1	١	_		
						1	١			
						J	١			
45	45.0					_]	[	1		
-2.2				_,_	Clayey Sand With Limestone Fragments (SC)			SS-10 taken at 17:06		
]		1.0	SS-10	7-9-8 (17)	45.0-46.0' - Same as 40.0-40.4' except 25% fine to coarse gravel-sized limestone fragments, fossiliferous	7		Installed 40.0' HW casing -		
	46.5			(17)		T	-1	1		
-						1	١	1		
-						1	١	1		
_						1	١	1		
-						1	١	7		
-						1	١	1		
-						1	١	1		
50	50.0					1	١	1		
-7.2	50.0				Clayey Sand With Limestone Fragments (SC)			-		
-		1.5	SS-11	20-14-11	50.0-51.5' - Same as 45.0-46.0' except staining over	+		-		
-	<b>54 5</b>	1.0	00 11	(25)	upper most 4.0', 40% fine to coarse gravel-sized limestone, trace moderate brown to dusky brown			-		
-	51.5				(5YR 3/4 to 5YR 2/2) concretions	¥	44	-		
-						+	١	8:22 water level at 18.0' below ground		
-						+	١	surface on 4/7/07		
-						+	١	N-rod (5.0' sections) 45.0' HW casing in hole		
-						+	١	1/8 50-lb bag of QuikGel brand bentonite -		
-						+		added to mud vat 3-7/8" tricone roller drill bit		
-						+	١	SS-11 taken at 09:42		
55 <u> </u>	55.0				Clayey Gravel With Sand (GC)	1	,	100% circulation loss; refill vat, add 1/2 bag		
-12.2				22-15-14	55.0-56.2' - Same as 50.0-51.5' except 60% fine to	1		bentonite		
_		1.2	SS-12	(29)	coarse gravel-sized, 20-25% sand-sized, highly fossiliferous	1		11:02 Drillor's Domorks board at 52.01 light to		
-	56.5				IOSSIIIEIOUS	T	~_	11:02 Driller's Remark: hard at 53.0', light to moderate chatter, soft from 54.0'-55.0', hole		
-						1		collapse at bottom so that split spoon resting		
-						1		on 1.5' of cave-in material 11:15 N-rod pulled out to install NW casing –		
						1		with advancer and tricone roller drill bit		
_						1		wireline accessory (Serial Number: 83963- CN)		
						1		Refill mud vat, add 1/4 bag bentonite		
						1		SS-12 taken at 13:55		
60										
							١			



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GSC-01B SHEET 4 OF 6

# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724347.3 N, 457805.5 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION : Vertical								
WATER	LEVELS	: 3.0 ft bo	s on 03/1	10/07 S	START : 4/6/2007 END : 4/9/2007 LOGGER	R : T.	Stewart	
				STANDARD	SOIL DESCRIPTION	ניז	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLIC LOG		
H BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	PE P	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
THE AYE			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	/WB	INSTRUMENTATION	
-17.2				(N)	City Lineartes Consul With Cond (CM)		Drillarda Danaardii 44.05 ayyibab ta Ni gadi (5.0)	
-17.2	60.0			30-22-23	Silty Limestone Gravel With Sand (GM) 60.0-61.0' - Same as 55.0-56.2' except low plasticity -		Driller's Remark: 14:05 switch to N-rod (5.0' sections)	
-		1.0	SS-13	(45)	fines, 50% fine to coarse gravel-sized, 35% fine to coarse sand-sized, 15% fines, highly fossiliferous	Ш	2-7/8" tricone roller bit due to continued down-hole cave-in	
_	61.5				coarse sand-sized, 15% lines, highly lossililerous	1	SS-13 taken at 14:32	
_					<u>-</u>	1		
_					<u>-</u>		Switch back to NW casing advancer tricone roller drill bit, maintaining some circulation	
_					-	1	through HW set to 45.0' below ground	
_					-	1	surface	
_					-	1	_	
_					-	1	-	
65 <u> </u>	65.0				Clause Cand With Linearton Francourte (CC)	177	4 SC 14 taken at 16:02	
-22.2				19-16-10	Clayey Sand With Limestone Fragments (SC) 65.0-66.2' - Same as 60.0-61.0' except white to very		SS-14 taken at 16:02	
-		1.2	SS-14	(26)	light gray, (N9 to N8), low plasticity, medium light gray (N6) staining over bottom half of sample, fine to			
-	66.5				coarse sand-sized, 35% fine to coarse gravel, 20-25% /-	ľ	Last run of 4/7/07	
-					fines, highly fossiliferous	1	-	
_					-	1		
_					-	1	_	
_					-	1	-	
_					-	1	1	
_					<u>-</u>	1	_	
70	70.0				2 1 5 (2) (2)	ļ,,	1,005	
-27. <del>2</del>				6-7-8	Sandy Fat Clay (CH) 70.0-71.5' - pale green with pale olive gray sands, (6G -		08:35 water level at 3.0' below ground surface on 4/8/07	
_		1.5	SS-15	(15)	6/2 with 5Y 5/2), moist, stiff, high plasticity, no		]	
_	71.5				dilatancy, trace dusky blue (5PB 3/2) mottling, 30% very fine to fine silica sand, 5% carbonate sand in		65.0' NW installed Using NW casing advancer with wireline	
_					\ irregular pockets, carbonate clasts with mild HCl	1	tricone drill bit accessory	
_					reaction	1	N-rod (5.0' sections) 140-lb hammer via cathead	
_					<u>-</u>		]	
_					-	1	SS-15 taken at 09:02	
1 -					-	1		
1 -					-	1	5.0' NW casing added to advance boring	
75	75.0				Clause Cand With Limeater - Francis - (20)	1	Drillaria Damariu 00:20 i- III i tit-i	
-32.2				12-17-15	Clayey Sand With Limestone Fragments (SC) 75.0-76.5' - white to bluish white, (N9 to 5B 9/1), wet,		Driller's Remark: 09:20 he'll have to switch back to 2-7/8" tricone drag bit to get through	
-		1.5	SS-16	(32)	dense, fine to coarse grained, very strong HCI		clay - will no longer be advancing NW casing	
-	76.5				reaction, trace dark gray (N3) mottling or staining,  25-30% low to medium plastic fines, 15-20% fine		70.0' NW currently installed Driller's Remark: 09:40 good circulation	
-					$\$ gravel-sized, 1-1/2" silty sand (SM) seam and fat clay $/$	1	through NW casing	
1 -					(CH) seam, highly fossiliferous	1	Two irregular blows in SS-16 SPT	
-					-	1	SS 16 taken at 00:59	
1 -					-	1	SS-16 taken at 09:58	
-					-	1	Driller's Demorks adding another 5 O another	
-					-	1	Driller's Remark: adding another 5.0' section of NW casing, losing depth to cave-in	
80						$\vdash$	, , , , , , , , , , , , , , , , , , ,	



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-01B SHEET 5 OF 6

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724347.3 N, 457805.5 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLIN	G METH	<u>OD AND</u>	EQUIPM	ENT : CME 550 S	/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 3.0 ft b	gs on 03/	10/07	START : 4/6/2007 END : 4/9/2007 LOGGER : T. Stewart
I				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	AL (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
BEL JSF/		RECOVI	ERY (ft)	TEGT REGOETS	SOIL NAME, USCS GROUP SYMBOL, COLOR,  DEPTH OF CASING, DRILLING RATE,
YHY YAT VAT			#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR ONSISTENCY, SOIL STRUCTURE, MINERALOGY SINSTRUMENTATION
SUF			#1175	(N)	\( \sigma \)
-37.2	80.0				Clayey Sand With Limestone Gravel (SC) SS-17 taken at 10:42
_		1.5	SS-17	4-6-11	80.0-81.5' - Same as 75.0-76.5' except white to bluish white, (N9 to 5B 9/1), wet, medium dense, fine to
-			00	(17)	coarse grained, strong HCl reaction, low to medium
-	81.5				├_ plastic fines, trace medium dark gray (N4) staining,
-					\35-40% plastic fines, 15% fine gravel-sized limestone, / _
-					
_					
_					<b>]</b>
					<b>1</b>
85 -	85.0				<b>1</b>
-42.2	00.0				Interbedded Sands And Clays, Silty Sand (SM)  SS-18 taken at 11:19
-		1.5	SS-18	4-5-12	│ 85.0-85.2' - yellowish gray, (5Y 7/2), wet, medium
-	0.5 -	'		(17)	dense, nonplastic, mild HCl reaction, silica sand, trace Driller's Remark: 75% circulation loss at
-	86.5				reaction in carbonate sand   85.0'
-					Fat Clay (CH)
_					85.2-85.3' - grayish green, (5Y 5/2), moist, stiff, high plasticity, no dilatancy, no HCl reaction, trace dusky
_					blue (5PB 5/2) mottling lense of yellowish gray (5Y
_					8/1) silt/clay, trace white (N9) fine sand-sized   particles, trace flat subrounded pyrite 1/8"-1/4"   -
					fragments
					Clayey Sand (SC)
90	90.0				85.3-86.5' - moderate yellowish brown, (10YR 5/4), moist, medium dense, fine silica sand, trace fine
-47.2	00.0				carbonate sand, 40-45% medium plastic fines, mild SS-19 taken at 11:27
-		1.5	SS-19	5-14-22	HCI reaction in carbonate grains
-	04.5		00.0	(36)	Interbedded Silty Sand And Fat Clay, And Clayey
-	91.5				90.0-91.5' - Same as 85.0-86.5'
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_					4 1
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					] [
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95	95.0				11
-52.2					Fat Clay (CH) SS-20 taken at 11:55
-		1.4	SS-20	5-12-15	95.0-95.9' - Same as 85.0-86.5' except no yellowish gray lens, white fine sand-sized particles in pockets
_	06.5			(27)	Clayey Sand (SC)
-	96.5				│ 95.9-96.4' - Sàmé as 85.0-86.5' except 35-40% low to / ┤
-					\medium plastic fines / _
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PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724347.3 N, 457805.5 E (NAD83)

ELEVATION: 42.8 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

SAMPLE INTERVAL (f) TEST RESULTS SOIL NAME USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT RELATIVE DENSITY OR CONSISTENCT. SOIL NAME USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT RELATIVE DENSITY OR CONSISTENCT. SOIL STRUCTURE, MINERALORY OR LOCAL STRUCTU	WATER	LEVELS	: 3.0 ft b	gs on 03/1	10/07	START : 4/6/2007
SECONSTRIP (#)   SECO	>00				STANDARD	SOIL DESCRIPTION g COMMENTS
1.5   SS-21   7-9-8   (16)   1.5   SS-21   7-9-8   (16)   100 - 101.5 - yellowish gray, (SY 7/2), wet, medium dense, fine grained, no HOI reaction, silica sand, 15-20% nonplastic lines, trace very fine sand-seze black particles, trace black staining near bottom of bample Bottom of Borring at 101.5 ft bgs on 4/9/2007   SS-21 talwan at 122.2   SS-21 talwan at 122.	ANE (#	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISCS COOLID SYMPOL COLOD
1.5   SS-21   7-9-8   (16)   1.5   SS-21   7-9-8   (16)   100 - 101.5 - yellowish gray, (SY 7/2), wet, medium dense, fine grained, no HOI reaction, silica sand, 15-20% nonplastic lines, trace very fine sand-seze black particles, trace black staining near bottom of bample Bottom of Borring at 101.5 ft bgs on 4/9/2007   SS-21 talwan at 122.2   SS-21 talwan at 122.	H BE ACE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DEFIT OF CASING, DRILLING RATE,  MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
1.5   SS-21   7-9-8   (16)   1.5   SS-21   7-9-8   (16)   100 - 101.5 - yellowish gray, (SY 7/2), wet, medium dense, fine grained, no HOI reaction, silica sand, 15-20% nonplastic lines, trace very fine sand-seze black particles, trace black staining near bottom of bample Bottom of Borring at 101.5 ft bgs on 4/9/2007   SS-21 talwan at 122.2   SS-21 talwan at 122.	SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
1.5 SS-21 (16) dense, fine grained, no HOI reaction, silica sand. The sand sand.	-57.2	100.0			(/	Silty Sand (SM)
101.5  15-20's nonplestic fines, trace very fine sand-sized black particles, trace black stating near bottom of sample.  Bottom of Boring at 101.5 ft bgs on 4/9/2007  105  106  107  107  107  108  109  109  109  109  109  109  109	-		1.5	SS-21		dense fine avaigned the LICI reaction siling and
Seample   Bottom of Boring at 101.5 ft bgs on 4/9/2007	-	101.5			(10)	15-20% nonplastic fines, trace very fine sand-sized
Bottom of Boring at 101.5 ft bgs on 4/9/2007	-					Total gallons of grout mix. 12 bags of 47-lb each of
110 -67 2 						Bottom of Boring at 101.5 ft bgs on 4/9/2007
110 -67 2 	_					
110 -67 2 	_					
110 -67 2 	-	_				
110 -67 2 	-					
110 -6772	105_ -62.2					
-67.2 -115 -72.2	-					<u> </u>
-67.2 -115 -72.2	-					<u> </u>
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115 -722	110					
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-02	SHEET	1	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724300.1 N, 457447.2 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 1.4 ft bo	gs on 5/16	6/07	START : 5/15/2007 END : 5/17/2007 LOGGER : R. Bitely, D. Whitaker
				STANDARD	SOIL DESCRIPTION COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	0010
ACE TIOI		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  SOILMENTO DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
<u> 40.4</u>	0.0			(11)	Topsoil (OL)
-		1.1	SS-1	1-2-3	\ 0.0-0.3' - brownish black, (5YR 2/1), moist, very soft, 60% organic no fines, <40% roots/vegetative detritus
-	1.5	'''		(5)	Poorly Graded Sand With Some Limestone
-	1.5				Fragments (SP)
_					\loose, very fine to fine grained, nonplastic, trace /
-					nonplastic fines, 10-15% organics, silica sand
					]
					] [
_					<b>]</b>
5	5.0				
35.4				5-18-10	Sandy Clay And Organic Wood Debris (SC)  Driller's Remark: Wood from 5.0-8.5' below surface,
_		0.4	SS-2	(28)	moist, very stiff, medium plasticity, no to mild HCl   several scoops of wood chips removed from mud pit
-	6.5				carbonate sands, 50% of sample is wood debris
-					Driller's Remark: Smooth, easy drilling, light
-					chatter at 7.0' and 9.5'
-					
-					
-					
10	10.0				
30.4	10.3	0.3	SS-3	50/4	Silt (ML)
-				(50/4")	\ \ 10.0-10.3' - grayish yellow, (5Y 8/4), moist to wet, hard, nonplastic, rapid dilatancy, mild HCl reaction,
					\\ 5-10% very fine sand, 5-10% limestone fragments \\ \langle - \\ \  \langle - \\ \  \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
					174 diameter, carbonate materials
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15 <u> </u>	15.0				Silt (ML)
-		0.5	SS-4	13-3-8	15.0-15.5' - grayish yellow with moderate yellow lenses, (5Y 8/4 with 5Y 7/6), moist to wet, stiff,
-	16.5	0.5	00-4	(11)	\nonplastic, rapid dilatancy, moderate HCl reaction,
-	16.5				\10-15% very fine to medium sand, carbonate
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-02	SHEET	2	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724300.1 N, 457447.2 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 1.4 ft bo	gs on 5/16	6/07 S	START : 5/15/2007 END : 5/17/2007 LOGGER	R : R.	Bitely, D. Whitaker
				STANDARD	SOIL DESCRIPTION	(J	COMMENTS
N (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	OOL NAME HOOG ODG! TO STATES! OO! OT	) Lo	DEDTIL OF CACING SOURCE SATE
ACE VTIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	OLIC OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
20.4	20.0	0.2	SS-5	50/5	─ Sandy Silt (ML)	Ш	
-				(50/5")	20.0-20.2' - grayish yellow, (5Y 8/4), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl	1	1
-					reaction, 30-35% fine to coarse sand-sized limestone fragments, lenses <1/4" thick, carbonate materials	1	1
					liagments, lenses < 1/4 trick, carbonate materials		]
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-					<u>-</u>	1	_
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-					-	ł	-
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25 <u> </u>	25.0				Sandy Silt With Limestone Lenses (ML)	Ш	-
-		1.2	SS-6	35-40-35	25.0-26.2' - grayish yellow, (5Y 8/4), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl	$\  \ $	-
-	26.5			(75)	reaction, 25% fine to medium sand, <30% limestone	Ш	-
-	20.0				lenses <1/4" thick, carbonate materials	1	1
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30 <u> </u>	30.0				Silt With Limestone Lenses (ML)	Н	Stop drilling for the day at 17:30,
-		1.0	SS-7	15-15-40	30.0-31.0' - Same as 25.0-26.2' except dark yellowish orange, (10YR 6/6)	$\  \ $	resume drilling 5/16/07 08:00, - water level at 1.4' below ground surface
-	31.5	1.0	00 /	(55)	orange, (101K 6/6)	╫	water lever at 1.4 below ground surface
-	31.3				-	1	1
-					_	1	1
					_		]
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35 5.4	35.0			35-50/2	Silty Sand (SM)	1111	Driller's Remark: Moderate to light chatter
-	35.7	0.5	SS-8	(85/8")		111	Driller's Remark: Moderate to light chatter from 35.0-39.0'
-					\dense, moderate HCl reaction, fine to coarse sand, \dagger 30% nonplastic fines, carbonate materials	ł	-
-					-	1	1
-					-	1	1
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] _							]
-					_		
-					-	-	Driller's Remark: 39.0-40.0' rapid smooth drilling
40						$\vdash$	-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-02	SHEET	3	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724300.1 N, 457447.2 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 6" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 1.4 ft b	gs on 5/16	6/07	START : 5/15/2007	END : 5/17/2007	LOGGEF	? : R.	Bitely, D. Whitaker
300				STANDARD		SOIL DESCRIPTION		ق	COMMENTS
AND S	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME	E, USCS GROUP SYMBOL, (		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE ACE		RECOVE	ERY (ft)		MOISTURE	CONTENT, RELATIVE DEN	SITY OR	BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENC	CY, SOIL STRUCTURE, MINE	ERALOGY	SYM	INSTRUMENTATION
0.4	40.6	0.3	SS-9	50/3.5	Silty Sand And	Limestone Fragments (S	M)	Ш	Driller's Remark: Smooth drilling with
				(50/3.5")	gravel-sized lim	ne as 35.0-35.5' except 35 estone fragments	-40% line / -		moderate to fast movement, intermittent light - chatter
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45_	45.0						_		_]
-4.6				18-20-35	Sandy Silt And 45.0-46.3' - San	Limestone Lenses/fragm ne as 40.0-40.3' except 25'	ents (ML) % -		
_		1.3	SS-10	(55)	nonplastic fines	, 35% fine gravel-sized lim	estone _		_
-	46.5				fragments in len	1562		╫	-
-							-	1	-
-							-	l	-
-							-		1
							_		
_							-		_
50 -9.6	50.0				Limestone And	I Silty Sand		H	-
-	50.9	0.8	SS-11	50-50/5 (100/11")	50.0-50.8' - San	ne as 45.0-46.3' except 60	% fine to -	Ħ	-
-	00.0				\to coarse sand,	ized limestone fragments, 15-20% of nonplastic fines	30-35% fine		-
-					Begin Rock Cor See the next sh	ring at 51.0 ft bgs leet for the rock core log	-	1	1
					ood are next on	oction the rook core log	_		]
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-02

SHEET 4 OF 8

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724300.1 N, 457447.2 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 1.4	ft bgs	s on 5	16/07 START : 5/15/2007 END : 5/	17/200	D7 LOGGER : R. Bitely, D. Whitaker							
≥∩≎	_ (9			DISCONTINUITIES	G	LITHOLOGY	COMMENTS						
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,						
H BI	E RU STH, OVER	D (%)	TUF FOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD						
SURF SURF	SOR	RQ	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.						
	51.0	_		54.01.15.11.11.11.11.11.11.11.11.11.11.11.11		Limestone	Establish rock contact at						
-			2	51.2' - Bedding plane, horizontal, smooth, undulating, open <1/4"	Н	<ul> <li>51.0-55.45' - pale yellow brown, (10YR 6/2), fine to medium grained,</li> </ul>	51.0' below ground - surface,						
-				51.7' - Fracture or mechanical break, 30 deg, rough, undulating, open <1/4"	Ħ	moderate to high HCl reaction,	set HW casing to 51.0'						
-			0	52.35' - Mechanical break	Ħ	<ul> <li>extremely weak to weak (R0 to R2), voids &lt;1/16" diameter over 50% of</li> </ul>	below ground surface - Begin rock coring using						
-	R1-NQ			53.05' - Fracture or mechanical break, 30	Ш	surface, trace fossil molds <1/2"	NQ wireline tooling from 51.0' below ground						
_	5 ft 89%	58	6	deg, rough, undulating, open <1/4" 53.25, 53.6, 53.85' - Bedding plane or	deg, rough, undulating, open <1/4" diameter, trace cavities <1/2"								
_				mechanical break (3), horizontal, smooth,	Н	infill	surface _						
55 -			3	undulating, open <1/4"-1/2" 53.5' - Mechanical break	Н	_	R1:2 minutes						
-14.6			1	53.9' - Fracture or mechanical break, 20 deg	Ш								
	56.0		NR	and 40 deg, rough, undulating, open <1/4" 54.3' - Bedding plane or mechanical break,	Ш	No Recovery 55.45-56.0'	1						
			2	horizontal, smooth, undulating, open <1/4"-1/2"	Ш	Limestone - 56.0-61.0' - pale yellowish brown,	]						
				54.5' - Fracture or mechanical break, 20 deg	Ы	(10YR 6/2), fine to medium grained,	]						
			2	and 40 deg, rough, undulating, open <1/4" 54.6, 54.7' - Mechanical break (2)	H	high HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over							
_				54.75' - Fracture or mechanical break, 20	Ħ	40-50% of surface, trace fossil molds							
_	R2-NQ 5 ft	92	1	deg and 40 deg, rough, undulating, open		<del>-</del>							
_	100%			55.15, 55.4' - Bedding plane or mechanical	Ш	<del>-</del>	_						
_			1	break (2), horizontal, smooth, undulating, open <1/4"-1/2"		_	_						
60 <u> </u>				56.4, 56.8, 57.1, 57.7, 58.7, 59.2' - Bedding plane or mechanical break (6), <10 deg,	Н		R2:3 minutes						
-13.0			1	rough, undulating, open <1/4"	Н	_	K2.5 Illillutes						
_	61.0			60.1' - Fracture or mechanical break, 65 deg, smooth, undulating, tight to open <1/4"	Ш	61.0-64.5' - pale yellowish brown to	-						
-			3	61.5' - Bedding plane or mechanical break,	Ш	<ul> <li>light gray, (10YR 6/2 to N7), very fine</li> </ul>	-						
-				<10 deg, smooth to rough, undulating, open	ш	to medium grained, strong HCl reaction, 61.0-62.0' and 62.45-63.0'	-						
-			2	<1/2"-1/4" 61.7' - Mechanical break or fractures, 20 deg,	Ш	<ul> <li>very weak to weak (R1 to R2) rock, 62.0-62.45' extremely weak (R0)</li> </ul>	-						
-	R3-NQ		rough	rough, undulating, tight to open <1/2" -62.0' - Bedding plane or mechanical break,	Н	rock, 63.0-64.5' medium strong to	-						
-	5 ft 70%	44	2	<10 deg, smooth to rough, undulating, open	H	<ul> <li>strong (R3 to R4) rock, voids (&lt;1/16") over 30-50% surface except</li> </ul>	R3:3 minutes						
-	1073		2	<1/2"-1/4" 62.7' - Mechanical break or fractures, 20 deg,	Ħ	trace voids from 62.0-62.45', trace							
65				rough, undulating, tight to open <1/2"	H	<ul> <li>fossil molds &lt;1/2"diameter, trace cavities &lt;1/2" diameter from</li> </ul>							
-24.6			NR	62.95' - Bedding plane or mechanical break, — <10 deg, smooth to rough, undulating, open	Ш	61.0-62.0', trace organics No Recovery 64.5-66.0'							
	66.0			<1/2-1/4" 63.15' - Mechanical break or fractures, 50	Ш		1						
			1	deg, rough, undulating, tight to open <1/2"	Н	Limestone - 66.0-70.9' - pale yellow brown to	]						
			, I	63.35' - Mechanical break or fractures, 10 deg, rough, undulating, tight to open <1/2"	H	moderate yellowish brown, (10YR 6/2	]						
			3	63.5' - Mechanical break	Щ	to 10YR 5/4), very fine to fine grained, strong HCl reaction, very	]						
_	_			64.25' - Bedding plane or mechanical break, <10 deg, smooth to rough, undulating, open	Щ	weak to weak (R1 to R2), except							
-	R4-NQ 5 ft	88	0	<1/2-1/4" 64.4' - Mechanical break or fractures, 50 deg.	Ш	67.5-67.9' that is extremely weak  (R0) to very weak (R1) rock, voids	_						
_	98%			rough, undulating, tight to open <1/2"	Ш	(<1/16") over 30-50% of surface, 10-20% fossil molds <1/4" diameter,	_						
-			1	66.5, 67.45' - Fractures or mechanical break (2), 20 deg and 30 deg, rough, undulating,	H	trace cavities <3/4" by 1/2", trace							
70 <u> </u>				open <1/4"	H	organics	R4:5 minutes						
			2	67.7, 68.85' - Bedding plane or mechanical break (2), <10 deg, rough, undulating, open	H	-	1.4.5 Hilliules						
-	71.0			<1/2"	H								



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724300.1 N, 457447.2 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS : 1.4	ft bg	s on 5/	16/07 START : 5/15/2007 END : 5/	17/20	D7 LOGGER : R. Bitely, D. Whitaker	
≥□£	(%			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - 75 -34.6 - - -	R5-NQ 5 ft 100% 76.0 R6-NQ 5 ft 73%	18	0 3 2 2 3 >10 >10	69.1, 70.1, 70.5' - Bedding plane or mechanical break (3), <10 deg, smooth to rough, undulating, open <1/4" 71.5, 71.55, 73.6, 73.65, 73.9, 74.25' - Bedding plane or mechanical break (6), <10 deg, smooth to rough, undulating, tight to open <1/2"  74.65' - Fracture or mechanical break, 30 deg, rough, undulating, open <1/4"  75.7, 75.8' - Bedding plane or mechanical break (2), <10 deg, smooth to rough, undulating, open <1/2" 76.1, 76.3' - Fractures or mechanical break (2), <10 deg, rough, undulating, tight to open <3/4" 76.9' - Fracture or mechanical break, 40 deg, rough, undulating, open <1/2" 77.3' - Fracture or mechanical break, <10 deg, rough, undulating, tight to open <3/4" 77.5-78.8' - Fracture zone, rough, undulating, gravel-sized fragment, <2" diameter		No Recovery 70.9-71.0' Limestone 71.0-76.0' - pale yellowish brown to light gray, (10YR 6/2 to N7), very fine to medium grained, strong HCI reaction, weak to medium strong (R2 to R3), grain size increases with depth, except 73.5-74.7' extremely weak to very weak (R0 to R1) rock, voids (<1/16") over <20-50% of surface-variable, no cavities, few fossil molds <1/4" diameter, stong rock zone from 72.4-72.85'  76.0-79.65' - pale yellowish brown to light gray, (10YR 6/2 to N7), very fine to medium grained, strong HCI reaction, 76.0-77.8' and 78.7-78.9' very weak (R1) to weak (R2) rock, 77.8-78.7' and 78.9-79.65' medium strong (R3) to strong (R4) rock, voids (<1/16") over 20-30% of surface, trace fossil molds <1/4" diameter, about 10-20% cavities <1/12" diameter especially from 77.8-78.7'	R5:4 minutes
-39.6 -	81.0		NR	79.0, 79.15' - Fractures (2), rough, undulating, intersecting fractures at 90, 60, and 80 degrees, tight to open <1/4" 79.25' - Fracture or mechanical break, <10		No Recovery 79.65-81.0'	R6:8 minutes
-44.6	R7-NQ 5 ft 98% 86.0	60	>10 3 0 1 >10	deg, rough, undulating, tight to open <3/4" 81.0-81.6' - Fracture zone, smooth to rough, undulating, gravel-sized fragments <1"-1/2" diameter 81.6' - Bedding plane, <10 deg, smooth, undulating, unknown open thickness, adjacent to fragments above 82.1, 82.3, 82.4' - Fractures or mechanical break (3), rough, undulating, 3 intersecting fractures at 60, 60, and 50 degrees respectively, open <3/4" 83.5' - Mechanical break 85.0-85.2' - Fracture zone, rough, undulating, gravel-sized fragments <1" diameter 85.5, 85.6' - Fractures (2), 30 deg and 40		Limestone  81.0-85.9' - pale yellowish brown to light olive gray, (10YR 6/2 to 5YR 5/2), very fine to medium grained, moderate to strong HCl reaction, weak to strong (R2 to R4), voids (<1/16") over 40-60% of surface, moderately fossiliferous, many fossil molds/casts up to 2" diameter, trace cavities <1" diameter possible void space/cavity in fracture zone at 81.0-81.5', crystal infill, trace over surface except 82.0-82.5' over 50% of surface, trace organic lamintations especially at 81.8'	Stop drilling for the day at 18:00 -  Resume drilling 5/17/07 07:30, water level at 3.0' below ground surface -  R7:5 minutes -
90 -49.6	R8-NQ 5 ft 70% 91.0	56	1 0 >10 NR	deg, rough, undulating, 2 intersecting fractures, tight to open <3/4" 86.7, 86.8' - Fractures or mechanical break (2), 80 deg and 40 deg, rough, undulating, 2 intersecting fractures or mechanical breaks, tight to open <1/2" 87.25' - Fracture or mechanical break, 50 deg, rough, undulating, tight 87.45, 87.9, 88.2, 88.45, 88.65' - Mechanical break (5) 89.0-89.5' - Fracture zone, rough, undulating, gravel-sized fragments <1"-1/2" diameter		No Recovery 85.9-86.0' Limestone 86.0-89.5' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate to stong HCI reaction, weak to medium strong (R2 to R3), voids (<1/16") over 20-40% of surface, highly fossiliferous with fossil molds/casts <1/2" diameter, trace cavities <1" diameter  No Recovery 89.5-91.0'	Driller's Remark: Light chatter (89.5-91.0') R8:7 minutes



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724300.1 N, 457447.2 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 1.4	ft bgs	s on 5	/16/07 START : 5/15/2007 END : 5/	17/20	07 LOGGER : R. Bitely, D. Whitaker			
\$D\$	(%)			DISCONTINUITIES	စ္က	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
TH B	GTH, OVE,	(%) <sub>Q</sub>	CTUI	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOL	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD		
DEP SUR ELE	COR	a Q	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.		
					I	Limestone			
_			0		İ	<ul> <li>91.0-95.5' - pale yellowish brown to moderate yellowish brown</li> </ul>	1		
			2	92.1, 91.65, 93.45' - Bedding plane or		transitioning to yellowish gray beyond 94.0', (10YR 6/2 to 10YR 5/4 to 5Y	]		
				mechanical break (3), <10 deg, rough, undulating, open <1/4"		8/1), fine to very fine grained, grain	]		
_	R9-NQ 5 ft	64	>10	00.45.00.051. Franking many many		size fining with depth, weak to medium strong (R2 to R3) rock to			
_	90%	-		93.45-93.85' - Fracture zone, rough, undulating, organic zone, gravel-sized	╁┼	94.3', 93.46-93.05' and 94.3-94.7' extremely weak (R0) rock with red	_		
_			>10	fragments <1" diameter 94.1-94.7' - Fracture zone, smooth to rough,	H	organic soils, 94.7-95.5' very weak to	-		
95 <u> </u>			0	undulating, silt horizon, gravel-sized	F	weak (R0 to R2) rock, 93.45-93.85' fracture zone with interbedded	R9:8 minutes		
-			NR	fragments <2" diameter	Ħ	<ul> <li>organic silts up to 3/4" in the beds, 93.45-93.85' fracture zone with</li> </ul>	-		
-	96.0		IVIX		#	poorly competent silts to no	-		
-			0		Ħ	competent elastic silts (MH) up to 2" thick as beds, 91.0-93.45' voids	1		
_				97.05' - Mechanical break or bedding plane,	Ħ	<ul> <li>(&lt;1/16") over 50-60% of surface,</li> <li>highly fossiliferous with molds/casts</li> </ul>	1		
			1	horizontal and 70 deg, rough, undulating, tight	Ħ	<1" diameter, few cavities <3/4"	1		
	R10-NQ 5 ft	92	0	.9.1	╚	diameter, moderate to stong HCI reaction, 93.45-93.85' fragments with	]		
	100%	32	U			organics interbedded, 93.85-94.3' no			
_			3	99.0, 99.15' - Fractures (2), undulating, intersecting fractures, tight to open <1/4"	₽	voids, no cavities, very fine grained medium strong (R3) rock; 94.3-94.7'	_		
100_ -59.6				99.5' - Mechanical break	1	fragments with silt/elastic silt interbedded; 94.7-95.5' voids	D10:2 minutos		
-59.0			1	99.7' - Mechanical break or bedding plane, horizontal, rough, undulating, tight	(<1/16") over 10-50% of surface, few cavities <1/4" diameter, poorly		R10:3 minutes		
-	101.0			100.85' - Mechanical break or bedding plane,	H	- fossiliferous	-		
-			5	5	3   1	5 horizontal, smooth, undulating, open <1/4" 101.0, 101.1, 100.3, 101.6, 102.0' - Bedding	╆	No Recovery 95.5-96.0' Limestone	-
-				plane or mechanical break (5), smooth, undulating, open <1/4"	th, THE	96.0-101.0' - pale yellowish brown to yellowish brown, (10YR 6/2 to 5YR	1		
-			0	undulating, open 174	ш	5/2), very fine to fine grained, strong	1		
_	R11-NQ		10	103.0' - Fractures (>5), smooth, undulating, 5		HCI reaction, very weak to weak (R1 to R2), voids (<1/16") over <20-50%	1		
	5 ft 99%	73	10	plus intersecting fractures from one main fracture, 70 degrees with 0 degree minor,		of surface (variable), trace organics, trace infill, trace laminated bedding,	]		
			0	open <1/4" 103.6, 105.75' - Bedding plane or mechanical		moderately fossiliferous with fossil	]		
105				break (2), smooth, undulating, open <1/4"		molds/casts <1" diameter, trace — cavities	]		
-64. <del>6</del>			1			101.0-105.95' - yellowish gray, (5Y 7/2), very fine to fine grained, strong	R11:5 minutes		
-	106.0		NR/		+	<ul> <li>HCl reaction, weak (R2), voids</li> </ul>	-		
-			3	106.3, 106.6, 106.9, 107.1, 107.5, 107.9,	F	(<1/16") over 30% of surface, moderately fossiliferous with	-		
-				108.25, 108.7, 109.05' - Bedding plane or mechanical break (9), 40 deg, smooth to	F	<ul> <li>molds/casts &lt;1/2" diameter, trace organics</li> </ul>	-		
-			3	rough, undulating, tight to open <1/4"	Ħ	No Recovery 105.95-106.0'	-		
-	R12-NQ				Ħ	Limestone 106.0-111.1' - yellowish gray, (5Y			
-	5 ft 100%	70	2		#	7/2), very fine to fine grained, strong HCl reaction, weak (R2), voids	1		
			2		];	(<1/16") over <20% of surface,	1		
110_				109.5' - Mechanical break	片	moderately fossiliferous with molds/casts <1/2" diameter			
-69.6			4			<u> </u>  -	R12:4 minutes		
	111.0				⊭				



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724300.1 N, 457447.2 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 1.4	l ft bgs	s on 5	/16/07 START : 5/15/2007 END : 5/	17/20	07 LOGGER : R. Bitely, D. Whitaker	
<b>₹</b> □₽	(%)			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
P AN	N, AND 3Y (%	_	ZES T	DESCRIPTION	O'C	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUF	COF LEN REC	RQ	FRA PEF	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
_			>10	109.55, 110.05, 110.65, 110.85, 111.0' - Bedding plane or mechanical break (5), 40	Е	111.0-115.9' - yellowish gray, (5Y – 7/2), very fine to fine grained, strong	_
-				deg, smooth to rough, undulating, tight to open <1/4"	L	HCl reaction, weak (R2), voids (<1/16") over <10% of surface,	-
-			0	111.0-111.8' - Bedding plane (>10),	L	<ul> <li>poorly fossiliferous, laminated</li> </ul>	-
-	R13-NQ			horizontal, smooth, undulating, tight to open <1/4"		bedding from 111.0-111.3'	-
_	5 ft 98%	80	1	113.0' - Bedding plane, horizontal, smooth, undulating, tight to open <1/4"	H	Ē	1
			2	113.5' - Mechanical break 114.3' - Fracture or mechanical break, 80	H	_	
115_ -74.6				deg, rough, undulating, tight to open <1/4"	H	_	
-/4.0			0	-	H	-	R13:7 minutes
-	116.0		NR.		片	No Recovery 115.9-116.0'	-
-			2	116.4, 116.8, 117.55, 117.65, 117.7, 117.8,	H	<b>Limestone</b> 116.0-120.95' - yellowish gray, (5Y	-
-				118.2' - Bedding plane or mechanical break (7), rough, undulating, tight to open <1/4"	片	7/2), very fine to medium grained, strong HCl reaction, weak (R2),	
			4		]	voids (<1/16") over 30% of surface	]
_	R14-NQ 5 ft	70	3			increasing with depth, grain size and recrystallized texture increasing with	
_	99%	. •		118.6' - Mechanical break 118.85, 119.1, 119.2, 119.3, 119.4, 119.5,	Ľ	depth, moderately fossiliferous with molds/casts <1/2" diameter, trace	-
			6	119.6' - Bedding plane or mechanical break	H	_ laminated organics, 10-20% cavities <1/2" diameter	=
120_ -79.6				(7), rough, undulating, tight to open <1/4"	H	— Grantier	R14:3 minutes
-	121.0		1	120.2' - Mechanical break 120.5' - Bedding plane or mechanical break,	Ħ	-	-
			(NR) 0	rough, undulating, tight to open <1/4"	]	No Recovery 120.95-121.0' Limestone	]
_			0	_	H	121.0-125.85' - yellowish gray, (5Y 7/2), fine to medium grained, strong	_
_			3	122.15, 122.25, 122.6' - Bedding plane or mechanical break (3), smooth to rough,		<ul> <li>HCl reaction, very weak to medium</li> </ul>	-
-	R15-NQ			undulating, tight to open <1/2"	Ħ	strong (R1 to R3), rock strength increasing with depth, highly	-
-	5 ft 97%	65	0	123.1, 123.6, 123.8' - Mechanical break	Ħ	<ul> <li>fossiliferous from 122.8-125.7' with molds/casts and shells &lt;1" diameter</li> </ul>	-
-	97 /6				Ħ	<ul> <li>otherwise moderately fossiliferous,</li> </ul>	-
125			4	124.4, 124.55, 124.7, 124.9, 125.1, 125.4' - Bedding plane or mechanical break (6).		voids (<1/16") variable over surface from <10-20%, trace cavities <1/2"	1
-84. <del>6</del>			2	smooth to rough, undulating, tight to open	Ħ	— diameter -	R15:3 minutes
-	126.0		NR /	- 112	Ħ	No Recovery 125.85-126.0'	_
-			0		H	Limestone 126.0-131.0' - yellowish gray to	-
-				-	F	moderate yellowish brown, (5Y 7/2 to	-
-			0	127.3, 128.5, 129.6, 130.8' - Mechanical break (4)	厈	_ 10YR 5/4), very fine to medium grained, strong HCl reaction, very	
-	R16-NQ		0	. ,	F	<ul> <li>weak to weak (R1 to R2), voids (&lt;1/16") over 30-50% of surface, few</li> </ul>	1
-	5 ft 100%	100	U		F	cavities <1" diameter, moderately fossiliferous with molds/casts <3/4"	]
_			0		F	in diameter	_
130 -89.6				_	F	_	R16:3 minutes
-	404.0		0		F	-	-
-	131.0				F		-



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724300.1 N, 457447.2 E (NAD83)

ELEVATION: 40.4 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 1.4	I ft bgs	s on 5	/16/07 START : 5/15/2007 END : 5/	17/200	D7 LOGGER : R. Bitely, D. Whitaker	
>∩ ∵	(9)			DISCONTINUITIES	ပ္	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - - 135	Ö∃₩ R17-NQ 5 ft 100%	<u> </u>	3 1 1 5	THICKNESS, SURFACE STAINING, AND TIGHTNESS  131.5, 131.7, 131.9, 132.1' - Bedding plane or mechanical break (4), <10 deg and horizontal, smooth to rough, undulating, tight to open <1/4"  133.5' - Mechanical break 134.0, 134.25, 134.3, 134.4, 134.45, 135.05' - Bedding plane or mechanical break (6), <10 deg and horizontal, smooth to rough,		Limestone  131.0-136.0' - yellowish gray to medium light gray, (5Y 7/2 to N6), very fine to medium grained, strong  HCl reaction, weak to medium strong (R2 to R3), rock strength increasing with depth, voids <1/16" over 0-30% of surface, variable, <20% of core with laminated bedding, poorly fossiliferous with few fossil molds/casts <1/2" diameter, trace cavities <1/4" diameter	- - - - - -
-94. <del>6</del>	136.0		1	undulating, tight to open <1/4"			R17:4 minutes
-			2	136.3, 136.45, 137.1, 137.35, 138.1' - Bedding plane or mechanical break (5), <10 deg, smooth to rough, undulating, tight to		136.0-140.65' - pale yellowish brown to yellowish gray, (10YR 6/2, 5Y 7/2), very fine to medium grained, strong HCl reaction, very weak (R1) to weak	- -
-	R18-NQ 5 ft	44	3	open <1/4" - - - 138.5' - Mechanical break		- (R2) rock from 136.0-138.6', extremely weak to very weak (R0 to R1) rock from 138.6-139.5', weak to strong (R3 to R4) rock from	- - -
140	93%		>10	138.6, 138.95, 139.1, 139.3' - Bedding plane or mechanical break (4), <10 deg, smooth to rough, undulating, tight to open <1/4"		139.5-140.65', voids <1/16" over <20% of surface to 138.6', trace voids 138.6-140.65', moderately fossiliferous with fossil molds/casts <1/2" diameter, trace infill of cavities	-
-99. <del>6</del>	141.0		1 NR	-		- 136.0-138.6', many cavities up to 2" diameter some with infill  No Recovery 140.65-141.0'	R18:4 minutes - -
- -			4 >10	141.1' - Fracture or mechanical break, vertical and 0-3 deg, rough, undulating, intersecting fractures, tight to open <1/4"  141.8' - Bedding plane, <10 deg, rough, undulating, tight to open <1/4"		Limestone 141.0-145.7' - pale yellowish brown to yellowish gray, (10YR 6/2, 5Y 7/2), very fine to medium grained, strong HCl reaction, medium strong to	- - -
-	R19-NQ 5 ft 94%	62	>10	142.3, 142.45, 142.55' - Fracture or mechanical break (3), <10 deg and 70 deg, rough, undulating, variable orientation, open <1/2"  142.9-143.2' - Fracture zone, rough,		strong (R3 to R4), voids <1/16" over <10-30% of surface, cavities 2" diameter over 20-40% of surface, few cavities with infill and subhedral	- - -
145 <u></u> -104.6	146.0		0	undulating, gravel-sized fragments <1" diameter  143.25' - Bedding plane or mechanical break, <10 deg and 10 deg, rough, undulating, open		crystal faces, highly fossiliferous with fossil molds/casts to 1" diameter, trace laminated bedding especially 144.45-144.7"	R19:5 minutes -
-	146.0		NR 3	<1/2"		No Recovery 145.7-146.0' Limestone 146.0-151.0' - yellowish gray, (5Y 7/2), very fine to fine grained, strong	- -
-	D00 N0		3	mechanical break (3), <10 deg and 10 deg, rough, undulating, open <1/2" - 146.35, 146.5, 146.55, 147.2, 147.3, 147.7' -		HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over <10% of surface, few fossils <1/2" diameter, laminated bedding over	-
-	R20-NQ 5 ft 100%	92	0	Bedding plane or mechanical break (6), <10 deg, smooth to rough, undulating, tight to open <1/2"  148.5' - Mechanical break		- <15% of surface, trace infill	Drilling completed 5/17/07 - 12:30 -
150 -109.6			1	150.25' - Bedding plane or mechanical break, <10 deg, smooth to rough, undulating, tight to — open <1/2"		- _ _	R20:4 minutes
	151.0		'			Bottom of Boring at 151.0 ft bgs on 5/17/2007	



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	GSC-03	SHEET	1 OF 10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724068.0 N, 457449.3 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

WATER	LEVELS	: 0.1 ft bo	gs on 6/3/	/07 5	START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		RECOVE	ERY (ft)	12011120210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
				(N)	
40.5	0.0			0-1-1	Topsoil (OL)  SS-1: first 6" = weight of hammer  0.0-0.1' - brownish black, (5YR 2/1), wet, very soft,
_		0.4	SS-1	(2)	│ \\60% organic nonplastic fines, 40% roots/vegetative │ │ │ │ │ │ │
_	1.5				\  \  \  \  \  \  \  \  \  \  \  \  \
_					\0.1-0.4' - moderate yellowish brown, (10YR 5/4), wet, \ \
_					very loose, fine silica sand, 15% organics decreasing with depth
l _					
l _					<b>」</b>
l _					<b></b>
_					<b>」</b>
5	5.0				
35.5				0.5.5	Poorly Graded Sand (SP) 5.0-6.0' - yellowish gray grades to pale yellowish
l _		1.0	SS-2	2-5-5 (10)	brown, (5Y 8/1 to 10YR 6/2), wet, very fine to fine
l _	6.5			( - /	grained, color grades at 5.6', silica sand with trace nonplastic fines increasing to 30% high plastic fines in -
					brown material
_					
_					
10	10.0				] [
30.5					Silty Sand (SM) SS-3: first 6" = weight of hammer
l <sup>-</sup>		1.3	SS-3	0-6-7 (13)	10.0-11.8' - grades from grayish orange (10.0-10.5') to
	11.5			(10)	(10.8-11.3'), (10YR 7/4 to 10YR 6/2 to 10YR 8/2), wet, medium dense, very fine to fine grained, iron staining
					(orangish red) from 10.0-10.8', silica sand, 30%
					\nonplastic fines /
					11
-					11
					1
-					1
15	15.0				1
25.5					Silty Sand (SM)
-		1.3	SS-4	4-6-6 (12)	15.0-16.0' - pale yellowish brown, (10YR 6/2), wet, medium dense, very fine to fine grained, silica sand
-	16.5			(12)	with 20% nonplastic fines
-					Sandy Fat Clay (CH) 16.0-16.25' - pale yellowish brown, (10YR 6/2), wet,
-					\stiff, medium plasticity, no to slow dilatancy, 30-35% /
-					very fine silica sand
-					<b>                                   </b>
-					<b>                                   </b>
I -					<b>                                   </b>
20					<b>                                   </b>



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-03 SHEET 2 OF 10

# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724068.0 N, 457449.3 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

WATER	LEVELS	: 0.1 ft bo	gs on 6/3/	07 5	START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker
300				STANDARD	SOIL DESCRIPTION g COMMENTS
AND (f)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FULLING
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
20.5	20.0				Fat Clay (CH)  SS-5: first 6" = weight of hammer
		1.3	SS-5	0-2-3 (5)	20.0-20.45' - wet, stiff, no dilatancy, pale blue from 20.0-20.2', light olive gray from 20.2-20.45', (5G 6/2,
_	21.5			(-)	5Y 6/1), high plasticity fines, mild HCl reaction possibly from interbedded silt, one limestone fragment
-					│ ∥or concretion, no HCl reaction │ │
-					Silt (ML)   20.45-20.9' - very pale orange, (10YR 8/2), wet, soft,   -
-	-				nonplastic, rapid dilatancy, mild HCl reaction, 5-10% very fine to fine sand-sized, carbonate materials
-	-				Fat Clay (CH)
-					20.9-21.3' - Same as 20.2-20.45'
25	25.0				-
15.5	23.0				Silt (ML)
-	-	1.5	SS-6	2-5-13 (18)	25.0`-26.´5' - grayish yellow, (5Y 8/4), wet, very stiff, nonplastic, rapid dilatancy, moderate HCI reaction,
-	26.5			(10)	coarse sand to fine gravel-sized limestone fragments from 26.2-26.5', carbonate materials
					Trom 26.2-26.3 , carbonate materials
_					<u> </u>
-					_
-					
-					-
-					-
30 10.5	30.0				Silty Sand (SM)
-	-	1.0	SS-7	5-12-13	30.0-31.0' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), moist to wet, medium dense,
-	31.5			(25)	
-	00				\20-25% nonplastic fines, fine gravel-sized limestone / - fragments, carbonate materials
_					]
-					_
-					
-					-
35 5.5	35.0			10.50/0	Silty Sand And Limestone Fragments (SM)
-	36.0	1.0	SS-8	19-50/6 (69/12")	35.0-36.0' - light olive gray, (5Y 5/2), wet, very dense, moderate HCl reaction, very fine to coarse sand-sized
-	36.0				grains, 25% nonplastic fines, 50% of sample is fine to
-	-				\coarse gravel-sized limestone fragments, carbonate \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
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-	-				]
40					
L					



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	GSC-03	SHEET	3 OF 10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724068.0 N, 457449.3 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

WATER LEVELS: 0.1 ft bgs on 6/3/07					START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whi	itaker
_				STANDARD	SOIL DESCRIPTION	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE INTERVAL (ft)  RECOVERY (ft)  PENETRATION TEST RESULTS		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
DEP SUR ELE			#TYPE	6"-6"-6" (N)	SONSISTENCT, SOIL STRUCTURE, IMINERALOGI	INSTRUMENTATION
0.5 - -	40.0 40.8	0.7	SS-9	16-50/4 (66/10")	Silty Sand And Limestone Fragments (SM) 40.0-40.7' - yellowish gray, (5Y 7/2), wet, very dense, fine to coarse sand-sized, 35% low plastic fines, 40% of sample is limestone fragments from 40.0-40.2',	-
	<del>45</del> .2	0.2	SS-10,	50/2.5	mild HCl reaction from 40.2-40.7'	- - - - - -
- - - - - -				<u>(50/2.5")</u>	45.0-45.2' - yellowish gray, (5Y 7/2), mild HCl reaction, coarse sand to fine gravel-sized material	- - - - - - -
50 -9.5 -	51.5	1.4	SS-11	0-3-2 (5)	Silty Sand (SM) 50.0-51.4' - yellowish gray, (5Y 7/2), wet, loose, fine to coarse grained, mild HCl reaction, 30% nonplastic fines, all carbonate	S-11: first 6" = weight of hammer -
	55.0 55.3	0.3	<u>SS-12</u>	50/4 (50/4")	Limestone Fragments  55.0-55.3' - yellowish gray, (5Y 7/2), mild HCl reaction, coarse sand to fine to coarse gravel-sized fragments	- - - - - - - - - -
- - - - 60					- - - - -	- - - -



PROJECT NUMBER:	BORING NUMBER:	
338884.FL	GSC-03	SHEET 4 OF 10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724068.0 N, 457449.3 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

WATER LEVELS: 0.1 ft bgs on 6/3/07					START : 6/3/2007	END: 6/6/2007	LOGGER	: D.	Whitaker
				STANDARD	S	OIL DESCRIPTION		SYMBOLIC LOG	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	RECOVE		PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY				DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
-19.5 - - - - - -	60.0 60.8	0.8	SS-13	10-50/4 (60/10")	plasticity, rapid dila \( \) sand to fine to coar	it sh gray, (5Y 7/2), wet, ha tancy, mild HCI reaction, se gravel-sized limeston 0-60.3' and 60.75-61.0', o	coarse e /		Water level 0.1 ft below ground surface at 0742, 08:06 Set casing-HW casing to 60.0', -09:50 HW casing down 30.0', water gushing out top of casing above ground surface-continue setting casing, 10:08 hole caving, 15:50 only get 35.0' HW casing in
-5 -24.5 	65.0 65.3	0.3	SS-14	50/3 (50/3")	Limestone Fragme 65.0-65.3' - yellowis reaction, coarse sa fragments	ents sh gray, (5Y 7/2), mild H0 nd to fine to coarse grave	CI el-sized		Begin SS sampling again at 65.0' at 16:30
- 70_ -29.5 - - -	70.0	0.0	\SS-15 <i>)</i>	50/1 (50/1")	No Recovery 70.0- Begin Rock Coring See the next sheet		- - - - - - -		- - - - - - -
- - 75 -34.5 - - - -							- - - - - -		- - - - - - - - - - - - - - - - - - -
- - 80							- - -		- -



PROJECT NUMBER:

338884.FL

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GSC-03 SHEET 5 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724068.0 N, 457449.3 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, NW/HW casing

				icivi . Civic 55 5/14 255205, mud rotally, mg tools, may			ONLIVIATION: Vertical
WATER	LEVELS: 0.1	ft bg	s on 6	/3/07 START : 6/3/2007 END : 6/	6/200	LOGGER : D. Whitaker	
	_			DISCONTINUITIES	(n	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	F06	ROCK TYPE, COLOR,	
	E.Y.A.Y.	9	FRACTURES PER FOOT	DECORAL HON	SYMBOLIC	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
H N N	R F F F	(%) 🛭	E S	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	S S S S S S S S S S S S S S S S S S S	Ø	ZA ER	PLANARITY, INFILLING MATERIAL AND	ΣΨ	AND ROCK MASS	DROPS, TEST RESULTS, ETC.
		22	표교	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	, ,
-29.5	70.0			70.05, 71.3, 71.8, 72.7' - Bedding plane or	Ш	Limestone	08:30 Install 0.0-70.0' NW
-			1	mechanical break (4), <10 deg, smooth to	Н	- 70.0-73.6' - pale yellowish brown to	casing, 10:46 water level = -
-				rough, undulating, open <1/2" with very		moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, strong	0.2', Depth = 70.0', 12:00 _ Begin Rock Coring
l _			2	fine-sized gravel infill except in fracture at 71.3'	Ш	HCl reaction, weak to medium strong	Begin Rock Colling
			-	71.3	Н	(R2 to R3), voids (<1/16") over 40%	
l -	R1-NQ					of surface, trace cavities >1/16",	Driller's Remark: 72.0-72.5'
-	5 ft	67	1	72.4-72.5' - Mechanical break, horizontal and	ш	<ul> <li>fossil molds</li> </ul>	and 73.0-74.5' soft -
_	72%			80 deg, tight	$\vdash$	_	_
			0				
_					Ш	No Recovery 73.6-75.0'	1
-					Н	-	R1: 6 minutes
-			NR			-	-
75	75.0				Ш		
-34.5				75.0-75.05' - Fracture zone, angular fine	$\mathbb{H}$	Limestone	-
1 -			4	gravel		- 75.0-77.2' - pale yellowish brown to	-
-				75.2, 76.2, 76.3, 75.35' - Bedding plane or	Ш	moderate yellowish brown, (10YR 6/2	Drillor's Domark: 76 0 77 0
I _			>10	mechanical break (4), <10 deg, rough, undulating, 76.2' smooth and fine angular	$\mathbb{H}$	to 10YR 5/4), strong HCl reaction  75.0-76.1' - very fine grained,	Driller's Remark: 76.0-77.0' void -
			10	gravel in fracture (15 deg at 75.35') open		medium strong (R3), voids (<1/16")	Void
-	R2-NQ		>10	<1/2"	ш	over 5% of surface	1
-	5 ft	14		75.3' - Fracture or mechanical break, vertical,	+	- 76.1-77.2' - fine grained, very weak	-
_	44%			smooth, undulating, tight		to extremely weak (R1 to R0), voids	_
				75.5' - Mechanical break 76.45-77.2' - Fracture zone, smooth to rough,	Ш	(<1/16") over 30% of surface, cavities throughout from fossil molds	
_			NR	undulating, fine to coarse <2" diameter	Н	up to 1/2", 10% voids have	1
-				gravel, subangular		recrystallization infill	R2: 6 minutes
-					ш	<ul> <li>No Řecovery 77.2-80.0'</li> </ul>	-
80	80.0			_	ы		
-39.5				80.1, 80.8, 80.95' - Bedding plane (3), <10		Limestone	Driller's Remark: 80.0-82.0'
_			>10	deg, smooth to rough, undulating to stepped,	Н	- 80.0-81.25' - moderate yellowish	void, 82.0-83.0' soft, 83.0- 84.0' rock, 84.0-85.0' void,
-			>10	open <1/2", eroded surfaces	+	brown, (10YR 5/4), fine to medium grained, strong HCl reaction, strong	at top of 85.0' felt rock
_			- 10	80.25-80.4, 80.55-80.7' - Fracture zone (2), very fine to coarse angular to subangular		(R4), voids (>1/16") over 40% of	(84.9-85.0')
				gravel-sized limestone	Н	surface, up to 35% of core is cavity	_
	R3-NQ			81.0-81.35' - Fracture zone, very fine to		infill, trace cavities up to 1/4", fossil	
-	5 ft	0		coarse angular to subangular gravel-sized	Н	- molds	-
-	25%		NR	limestone	╀╫	No Recovery 81.25-85.0'	-
-			INE		П	<u>-</u>	_
					H		
-					Ш		R3: 4 minutes
					Ш	-	-
85 <u> </u>	85.0			95 0 95 05! Erocturo sono con fino es sulla	H	Limestone	Drillor's Domark verieus
-44.5			>10	85.0-85.05' - Fracture zone, very fine angular gravel and coarse sand-sized material and	Ш	Limestone - 85.0-85.6' - very pale orange, (10YR	Driller's Remark: various soft spots throughout,
			'	silt, possible infill	Ш	8/2), fine grained, strong HCl	could be silt or soft rock
I -				85.6-85.8' - Fracture zone, angular to	1 H	reaction, extremely weak (R0), voids	_
-			>10		口	- (<1/16") over 15-25% of surface, few	-
l -				gravel-sized, trace silt infill	ш	cavities up to 3/16" diameter, trace	1 -
	R4-NQ	22	\_10	86.3-86.5' - Fracture zone, fine to coarse-sized subangular to subrounded	Н	fossils up to 1/16"x1/8" - 85.6-88.2' - Same as 80.0-81.25'	
I -	5 ft 64%	22	>10	fragments	П	except very weak (R1) probably due	1
-	01/0		>10,	86.8, 87.0, 87.2' - Bedding plane or	╁┼	to less recrystallization in voids and	-
-				mechanical break (3), <10 deg, smooth to	H	<ul> <li>more cavities up to 3/4"</li> </ul>	-
l -			ND.	rough, undulating, tight except open <1/2" at	口	No Recovery 88.2-90.0'	1
			NR	87.0'	H		R4: 6 minutes
00	00.0				Ш		1
90_	90.0					_	<del> </del>



PROJECT NUMBER:

338884.FL

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GSC-03 SHEET 6 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724068.0 N, 457449.3 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, NW/HW casing

	WATER LEVELS: 0.1 ft bgs on 6/3/07 START: 6/3/2007 END: 6/6/2007 LOGGER: D. Whitaker									
WATER		ft bg:	s on 6		6/2007		COMMENTS			
ĕ□£	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	გ	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	Ä, ANI	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,			
A TIC	J.H.	(%) □	128	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	딩	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND			
PTI FV	ORE NG	οD	RAC:	PLANARITY, INFILLING MATERIAL AND	ΜB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
SE	CC EE RE	ď	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	2101 0, 1201 11200210, 210.			
-49.5				87.4-87.5, 87.85-88.2' - Fracture zone (2),	Ш	Limestone	Driller's Remark: lost			
_			8	fine to coarse-sized subangular to subrounded fragments	Ш	<ul> <li>90.0-90.35' - grayish orange, (10YR 7/4), fine grained, strong HCl</li> </ul>	circulation at 90.0-110.0', – 94.5-94.8' void			
-				90.1, 90.2, 90.3, 90.4, 90.55, 90.7, 90.8, 91.0'	$\Box$	reaction, extremely weak (R0), voids	34.3-34.0 Void			
-			3	- Bedding plane or mechanical break (8), <10	ш	- (<1/16") over 15% of surface, 25% of	-			
_	R5-NQ			deg, smooth, undulating, tight to open <1/2", 90.3' and 91.0' have fractured gravel-sized	Ш	rock has infilled molds or black organic material	_			
_	5 ft	46	1	fragments in the fractures	Ш	- 90.35-91.3' - Same as 85.0-85.6'	_			
	79%			91.35-91.45' - Fracture zone	Н	except 20-30% cavities up to 1-1/4"	_			
			2	91.5, 92.5, 93.8' - Bedding plane or mechanical break (3), <10 deg, smooth,		91.3-93.95' - Same as 86.6-88.2' - except cavities up to 1"				
			-	undulating, tight to open <1/2", 91.5' tight	Ш	- except cavilles up to 1				
					Ш	No Recovery 93.95-95.0'	R5: 5 minutes			
05	05.0		NR	-	${\mathbb H}$	-	-			
95 <u> </u>	95.0			95.0-95.1' - Bedding plane, 10 deg, rough,	口	 Limestone	Driller's Remark: 95.0-95.5'			
-			6	undulating, tight, eroded subrounded gravel	╂┴╂	<ul> <li>95.0-96.3' - grayish orange, (10YR)</li> </ul>	soft -			
_				fragments	ш	7/4), very fine to fine grained, strong	_			
			2	95.25, 95.4' - Bedding plane or mechanical break (2), <10 deg, rough, planar to	H	HCl reaction, weak (R2), voids - (<1/16") over 5% of surface, trace	_			
				undulating, tight, open <1/4" with fine gravel	Д	cavities up to 1/4", light olive gray				
	R6-NQ	_		at 95.4'	Н	(5Y 5/2) clay/silty clay infill from				
	5 ft 26%	0		95.6' - Bedding plane, <10 deg, smooth, planar to undulating, 1" of infill, clay and fine	Ш	- 95.45-95.65' No Recovery 96.3-100.0'	1			
_			NR	to very fine gravel-sized fragments	$\Box$	,	1			
_				95.75, 95.9' - Bedding plane or mechanical	$\Box$	-	-			
-				break (2), <10 deg, rough, planar to undulating, tight	H	-	R6: 5 minutes			
_				96.1-96.2' - Fracture zone	Ш	-	No. 3 minutes			
100_	100.0				Ш					
-59.5			>10	100.0-100.1' - Fracture zone, trace black staining, subangular to subrounded, very fine	Н	Limestone - 100.0-100.5' - very pale orange to	_			
				to coarse-sized gravel		grayish orange, (10YR 8/2 to 10YR				
				100.25' - Fracture, vertical and 70 deg,	Н	7/4), very fine grained, strong HCI				
				rough, undulating, black staining, trace (thin layer) silt/clay infill <1/16", tight <1/16"	Ш	reaction, very weak (R1), voids (<1/16") over 40% of surface, black				
_	R7-NQ			100.4-100.5' - Fracture zone, trace black	Н	organic staining, cavities up to 3/16",	-			
-	5 ft	0	ND	staining, very fine to coarse-sized subangular	口	fossil molds, trace fossils <1/8"	-			
-	10%		NR	to subrounded gravel	╂┼╂	No Recovery 100.5-105.0'	-			
-					П	-	-			
					Ш	_	<sub>  -</sub>   -			
1 _					$\square$	_	R7: 3 minutes			
	105.0				罝					
-64.5				105.1-105.4' - Fracture zone, angular to	Ш	Limestone				
			>10	subangular, very fine to coarse gravel-sized	Ш	<ul> <li>105.0-106.5' - yellowish gray to grayish yellow, (5Y 7/2 to 5Y 8/4),</li> </ul>	1			
-			>10	fragments 105.4-106.5' - Bedding plane, smooth,	╂┼╂	very fine to fine grained, very strong	1			
-				undulating, open 1/4"-1", tight	口	<ul> <li>HCl reaction, extremely weak (R0),</li> </ul>				
-	R8-NQ			- · · · · · · · · · · · · · · · · · · ·	╂┼┤	voids (<1/16") over 30-40% of surface, many recrystallized fossil	-			
-	5 ft	0			Ш	<ul> <li>casts up to 3/16", few black possibly</li> </ul>	-			
_	30%				╁┼┤	carbon or organic material up to 1/8",	-			
1 _			NR		尸	fossiliferous No Recovery 106.5-110.0'	]			
					Ш	_				
1 7					Ш	_	R8: 2 minutes			
110	110.0			-	Ш	=	1			
110	1 10.0				1 1					



PROJECT NUMBER:

338884.FL BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724068.0 N, 457449.3 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, NW/HW casing

00.1				IENT . CIVIE 33 3/N 299203, Mud Totally, NQ tools, NVV/F		-···g	ORIENTATION : Vertical
WATER	LEVELS: 0.1	ft bg	s on 6		6/2007		
200	(9)			DISCONTINUITIES	၂ ပ	LITHOLOGY	COMMENTS
N ANI	, ZN ND Y (%)		SI.	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	OUTE AND DEDTIL OF GARNING
불병은	RUN H, 4 ÆR	(%) 🛭	FRACTURES PER FOOT	DEDTH TYPE OPICATATION POHOUNESS	1 5 1	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
PT-FA-	RE VGT COV	οD	ACT R F(	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	MBC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R O	FE	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SY	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-69.5				110.05' - Bedding plane, <10 deg, smooth,	ш	Limestone	16:10 core barrel retriever
-			2	planar, open <1/16"	Н	- 110.0-112.25' - grayish yellow to	is boud and is pulling -
_				110.2' - Bedding plane, <10 deg, smooth to rough, undulating, trace gravel fragments in	日	yellowish gray, (5Y 8/4 to 5Y7/2), very fine to fine grained, strong HCl	casing with it, 16:14 got it out but have to pull out all
_			>10	fracture, open 1/2"-3/4"	╁┼┨	<ul> <li>reaction, extremely weak (R0),</li> </ul>	core barrel - tip is blocked -
_			_	111.4-111.9' - Fracture zone, medium sand	Ш	111.5-111.8' silt and sand-sized	_
_	R9-NQ 5 ft	23	3	to fine gravel-sized fragments, trace wet silt infill	H	material, voids (<1/16") over 50% of surface, 5+ cavities up to 9/16", few	_
	45%	20		112.1' - Bedding plane, <10 deg, rough,	П	fossil molds	
				undulating, open 3/4" with rock fragments,	Н		
_			NR	eroded planes/surfaces 112.2' - Bedding plane, <10 deg, rough,	Ш	=	-
-				undulating, open <1/4", eroded	Ш	_	R9: 3 minutes
				planes/surfaces	П	-	-
115 <u> </u>	115.0			_	Ш	No Recovery 112.25-120.0'	When core barrel was
, 4.5					$\square$	- 140 NGCOVELY 112.23-120.0	brought out after a
1 4					Ш	_	struggle, there was not any
					Н	_	recovery. May have dropped into borehole on
					$\Box$		way up.
	R10-NQ				Н	_	
	5 ft 0%	0	NR		Ш	=	_
_	0,0				$\Box$	-	-
-					+	_	-
-					廿	-	R10: 3 minutes
_					Н	_	-
120 -79.5	120.0				ш	Limestone	_
-7 3.5			>10	120.1, 120.2, 120.25, 120.6, 120.4, 120.9, 121.0' - Bedding plane or mechanical break	Н	<ul> <li>120.0-123.0' - very pale orange to</li> </ul>	_
				(6), <10 deg, smooth, planar to undulating,	$\square$	grayish orange, (10YR 8/2 to 10YR	_
			1	tight to 3/4" at 120.4', sand-sized material to		7/4), fine to medium grained, very strong HCl reaction, extremely weak	
			'	fine gravel-sized in most fractures due to soft core, breaks easily	Н	(R0), voids (<1/16") over 25% of	
	R11-NQ			122.15-122.5, 122.8-123.0' - Bedding plane	Ш	surface, trace cavities up to 3/16",	_
-	5 ft 60%	0	>10	(2), <10 deg, smooth, planar to undulating,	Н	<ul> <li>5% black organic material up to 1/2", many fossil molds, moderately to</li> </ul>	-
-	00 /0			tight to 1/4", partings closely spaced 122.5-122.8' - Fracture zone, fine angular to	口	highly fossiliferous	-
-				subangular gravel-sized fragments	╂┼╂	- 121.1-121.9' - Same as 120.0-123.0'	
-			NR		Ш	except loose material, wet, 70% silt, 30% fine to coarse sand	R11: 4 minutes
-					╁┼	No Recovery 123.0-125.0'	
125	125.0			405.0.405.01	日	- Limentone	Dellada Damari 105.5
-84. <del>5</del>			>10	125.0-125.2' - Fracture zone, fine to coarse-sized gravel and coarse sand-sized	H	Limestone - 125.0-125.1' - Same as 120.0-123.0'	Driller's Remark: 125.5- 126.0' void, 127.5-128.0'
				fragments, angular to subrounded	┟┴┨	_ 125.1-125.8' - light brownish gray,	soft, lost circulation at
1 7			- 40	125.3, 125.7, 125.8, 126.1, 126.2' - Bedding	Ш	(5YR 6/1), fine to medium grained,	127.0', 08:04 lots of chatter
1 7			>10	plane (5), horizontal, smooth to rough, planar, tight	1 + 1	<ul> <li>strong HCl reaction, very weak (R1), voids (&lt;1/16") over 50% of surface,</li> </ul>	at 128.0' -
1 -	R12-NQ			125.85-126.0' - Fracture zone, fine to	口	cavities up to 3/8", highly	1
-	5 ft	16	>10	coarse-sized gravel and coarse sand-sized fragments, angular to subrounded	╂┼╂	- fossiliferous, casts, molds, fossils	-
-	66%		2	126.1, 126.2' - Bedding plane (2), horizontal,	口	125.8-128.3' - Same as 120.0-123.0' except weak rock (R2)	-
-			<u> </u>	smooth to rough, planar, tight	╆╫	No Recovery 128.3-130.0'	-
-			ND	126.4-126.5, 126.75-126.95' - Fracture zone, fine to coarse-sized gravel and coarse	뭐	_	D40: 5 minutes
			NR	sand-sized fragments, angular to subrounded	凵	_	R12: 5 minutes
130	130.0				Ш		
1			1		1		1



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### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724068.0 N, 457449.3 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, NW/HW casing

WATER	LEVELS: 0.1	ft bg					7 LOGGER : D. Whitaker				
≥o≎	(%)			DISCONTINUITIES	g	2 L	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)					FRACTURES PER FOOT	DESCRIPTION	SSS, ON TOTAL STATE OF THE STAT	7	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
AAGE	ST. T.	(%) Q	F.0	DEPTH, TYPE, ORIENTATION, ROUGHNES	ss.	5	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND			
무유	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND			AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
	0,35	ď	E 5	THICKNESS, SURFACE STAINING, AND TIGH		9	CHARACTERISTICS	,			
-89.5	]		4	126.95-127.75' - Bedding plane, horizonta smooth to rough, planar, tight, partings	tai, _LL	$\pm$	<b>Limestone</b> 130.0-133.05' - yellowish gray, (5Y	_			
_			_	(127.05-127.25'), 127.35-127.75' rock is	Д	4	8/1), very fine to fine grained, strong	_			
			>10	eroded and rounded openings are up to <1-1/2" from rock's outer diameter to			HCl reaction, very weak (R1), voids (<1/16") over 40% of surface, many				
l -			/10	adjacent rock	Ъ	$+\Gamma$	have infill, cavities up to 3/8",	_			
_	R13-NC			128.2-128.3' - Bedding plane, horizontal a	and	#	casts/molds, moderately fossiliferous	_			
-	5 ft 64%	20	>10	86 deg, smooth, undulating 130.0-130.1' - Bedding plane, horizontal,		#		-			
-	0.70		1	smooth, undulating, limestone fragments		4	133.05-133.2' - Same as	-			
-	-			very fine to coarse gravel-sized from 130.0-130.1'		┱	130.0-133.05' except fine to medium	-			
-	1		NR	130.8, 131.0, 131.35' - Bedding plane or	+	+	grained, more fossiliferous No Recovery 133.2-135.0'	R13: 5 minutes			
405				mechanical break (3), <10 deg, smooth, undulating, tight to open 1/4"		$\exists$	,	-			
135 <u> </u>	135.0			131.46-131.75' - Bedding plane, <10 deg		╊	Limestone	_			
-			>10	smooth, undulating, tight	<u>`</u> . +⊢	+	135.0-135.3' - yellowish gray, (5Y	-			
-	-			131.75-131.9, 132.1-132.15,132.6-133.05 Fracture zone (3), angular to subangular		4	8/1), fine grained, strong HCl reaction, weak (R2), voids over 5%	_			
_			>10	gravel-sized limestone fragments		╚	of surface, poorly fossiliferous	-			
_				132.35' - Fracture, 35 deg, smooth, undulating, limestone fragments in fracture	ıre 📙	-	135.3-135.5' - Same as 135.0-135.3'	_			
_	R14-NC 5 ft	0	>10	open 1/2"-1"	· +	1	except very fine grained 135.5-135.8' - Same as 120.0-123.0'	_			
_	54%			135.0-135.2, 135.75-136.05' - Fracture zo	one _		135.8-135.95' - Same as	_			
_				<ul><li>(2), very fine to coarse angular to subrounded gravel sized limestone fragm</li></ul>	nents _	4	130.0-133.05' 135.95-136.5' - Same as	_			
_			NR	and coarse sand sized material			120.0-127.0'	_			
				135.35, 135.45, 135.55, 135.7' - Bedding plane or mechanical break (4), <10 deg,	' H	$-\Gamma$	136.5-137.7' - yellowish gray, (5Y 7/2), very fine to fine grained,	R14: 4 minutes			
140	140.0			smooth to rough, undulating, tight to 1/4"		+	extremely weak (R0), 50% limestone,	_			
-99.5				135.9' - Fracture, 75 deg, smooth to roug undulating, eroding fracture planes, grave			50% silt with sand-sized fragments, poorly fossiliferous, voids over 0-5%				
-	1		2	fracture		+	of surface	-			
-	1			136.0' - Bedding plane or mechanical bre <10 deg, smooth to rough, undulating, op		4	No Recovery 137.7-140.0'	-			
-	1		8	1/2" with fine gravel sand in fracture		╅	<b>Limestone</b> 140.0-143.65' - grayish orange,	-			
-	R15-NQ			136.05' - Fracture, 65 deg, smooth to rou undulating, eroding fracture planes, grave		╁	(10YR 7/4), fine to medium grained,	-			
-	5 ft 90%	38	>10	fracture	1	_	strong HCl reaction, weak (R2), voids (<1/16") over 5-10% of surface,	-			
-	90 /0			136.3, 136.6, 136.75' - Bedding plane or		#	fossiliferous with several	-			
-	1		>10	mechanical break (3), <10 deg, smooth to rough, undulating, tight to open 1/4" exce		+	molds/casts, cavities up to 1/2"	-			
-	1		>10	136.6', open 1/2" with fine gravel sand in		$\Box$	143.65-144.5" - very light gray, (N8), very fine grained, strong HCl	R15: 6 minutes			
	-		NR	fracture 136.75-138.3' - rock has fissures/fracture	es 🕂	ᅡ	reaction, strong (R4), moderately	-			
145 <u> </u>	145.0		INE	vertically	-	╬	fossiliferous, trace small voids, few cavities, fossil molds up to 3/4"	_			
- 134.5	-		>10	137.25' - Fracture, 85 deg, smooth to rou undulating, eroding fracture planes, grave		4	No Recovery 144.5-145.0'	-			
-				fracture		1	<b>Limestone</b> 145.0-145.2' - Same as 143.0-144.5'	-			
-			>10	140.45, 140.5, 141.4, 141.6-141.85, 142.0 143.5, 143.7' - Bedding plane or mechani	.06, <u> </u>	4	145.2-147.0' - pale yellowish brown,	-			
-				break (8), <10 deg, smooth, planar to		4	(10YR 6/2), fine to medium grained, weak to medium strong (R2 to R3),	-			
-	R16-NG 5 ft	45	3	undulating, tight to open 1/4" 142.6-142.8' - Bedding plane, <10 deg,	Ь.	4	voids (<1/16") over 25% of surface,	_			
	86%			smooth, undulating, tight		$\perp$	60-70% recrystallized surface/voids,	-			
_	]		2	143.5-143.7, 143.8-144.2' - Fracture zone		$\exists$ L	cavities up to 1"x3/8", trace black organic material, poorly fossiliferous	_			
	]			(2), 75 deg, rough, undulating, limestone fragments between the two fractures		$\pm$	3				
			1	145.0-145.2, 146.25-146.65' - Fracture zo	one 🗀	$+\Gamma$		R16: 9 minutes			
150	150.0		NR	(2), angular to subrounded fine to coarse-sized gravel limestone fragments.	<u> </u>	4		]			
							-				
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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724068.0 N, 457449.3 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, NW/HW casing

WATER	LEVELS: 0.1	ft bgs	s on 6	/3/07 START : 6/3/2007 END : 6/	6/2007	7 LOGGER : D. Whitaker	
>00	(0			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SLOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	T.H.	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EV.	ENG	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-109.5	075	œ	шФ	145.35' - Fracture, 30-35 deg, rough,	S	Limestone	Driller's Remark: 153.0-
-103.5			5	undulating, open <1/4" with limestone	Ħ	- 147.0-149.0' - very fine grained, very	153.5' void –
-				fragments in fracture 145.75, 145.85, 146.0, 148.5, 148.95, 149.0' -	H	strong (R5), black organic lineations, voids over <5% of surface, 90%	-
-			2	Bedding plane (6), <10 deg, rough,	Н	- recrystallized surfaces, many cavities	_
l -	547.110			undulating to stepped, tight to 1/2", most with sand to fine gravel-sized limestone fragments	ш	up to 3/8" 148.0-149.3' - Same as 125.8-128.3'	_
-	R17-NQ 5 ft	60	2	in fractures	ш	- No Recovery 149.3-150.0'	_
-	96%			146.95, 147.05' - Fractures (2), 25 deg, rough, undulating, open <1/2" with limestone	Н	Limestone	_
_			3	fragments in fractures		150.0-151.8' - pale yellowish brown to moderate yellowish brown, (10YR	_
_				147.2, 147.5, 148.15' - Mechanical break (3)	H	6/2 to 10YR 5/4), fine to medium	
_			1	150.3, 150.4, 150.45, 150.55, 150.85, 151.2, 151.75, 152.35, 152.55, 153.2, 154.4' -	Н	grained, strong HCl reaction, weak (R2), highly fossiliferous with molds	R17: 6 minutes
155_	155.0		NR.	Bedding plane or mechanical break (11), <10	Н	and casts (3/8"), voids (<1/16") over 40% of surface, strong rock (R4)	
-114.5 -			7	<1/4"	Ш	from 158.5-154.8'	_
_				150.75-150.9, 151.42-151.6, 154.2-154.5' - Fracture zone (3)	ш	No Recovery 154.8-155.0' Limestone	_
_			>10	150.85-151.0' - Fracture zone, coarse	Н	_ 155.0-159.7' - Same as 150.0-154.8'	_
_				gravel-sized 151.1' - Fracture, 60 deg, rough, planar	H	except 155.0-156.4' strong rock (R4), 157.0-158.2' and 158.2-159.9'	_
_	R18-NQ 5 ft	22	2	152.4' - Mechanical break		extremely weak rock (R0)	_
_	94%			152.55, 153.0' - Bedding plane or mechanical break (2), <10 deg, smooth, planar to	H	_	_
_			>10	undulating, tight to <1/4"	Ш	<u>-</u>	-
-				152.9-153.65 - Bedding plane, <10 deg, smooth to rough, undulating, tight	Н	_	D40: 0 minutes
-			>10	153.1' - Fracture, 75 deg, smooth, undulating,	Ш	_	R18: 8 minutes
160 -119.5	160.0		NR	2 bedding plane fractures perpendicular at 153.05', rough, planar open <1/4" —	ш	No Recovery 159.7-160.0'	_
-113.5			1	155.25, 153.4, 155.6, 155.75, 155.9, 156.2,	ш	<b>Limestone</b> - 160.0-164.8' - Same as 150.0-154.8'	-
-				156.28, 156.3, 156.4, 156.42, 156.6, 156.7, 156.8, 156.85, 156.9, 156.95, 156.97, 157.05,	Н	and 155.0-159.2' except medium	-
-			8	157.9, 159.2, 159.5' - Bedding plane or mechanical break (21), <15 deg, smooth to		strong to strong (R3 to R4), 160.0-160.3' and other zones of	-
-	D40 NO			rough, undulating, tight to <1/4"	H	recrystallized surface voids and limestone	-
-	R19-NQ 5 ft	58	1	160.3, 161.25, 161.5, 161.65, 161.7, 161.8, 161.95, 162.05, 162.2' - Bedding plane or	H	-	-
-	96%			mechanical break (9), <10 deg, smooth to	Н	_	-
-			2	rough, undulating, open up to <1/2", most open <1/4" or tight	Ш	_	-
-				162.25, 162.5' - Mechanical break (2)	口		R19: 11 minutes
-			2	163.1, 163.6, 164.3, 164.5' - Bedding plane or mechanical break (4), <10 deg, smooth to	Ш	_	-
165 <u> </u>			NR	rough, undulating, open up to <1/2", most —	Н	— No Recovery 164.8-165.0'	_
-			3	open <1/4" or tight 165.0-165.1, 166.07-166.15, 166.5-166.6,	Н	Limestone 165.0-169.7' - Same as 150.0-165.0'	=
-				166.9-166.95' - Fracture zone (4)	H	<ul> <li>except very fine grained and strong</li> </ul>	-
-			6	165.75, 165.85, 166.07, 166.15, 166.35, 166.5, 166.6, 166.9' - Bedding plane or	Ш	rock (R4) from 166.0-166.5'	-
-	R20-NQ			mechanical break (8), <10 deg, smooth to	Н	_	-
-	5 ft	21	5	rough, planar to undulating, few are partings, tight to open 1/2", sand to fine gravel-sized	H	_	-
1 -	94%			limestone fragments in fracture	囯	_	-
-			5	-	団	_	-
-				-	Ш	-	R20: 10 minutes
170	170.0		6	-	$\square$	No Recovery 169.7-170.0'	-
1/0	170.0		NR		Ħ		-



PR	OJECT NUMBER:	BORING NUMBER:					
3	38884.FL	GSC-03	SHEET	10	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724068.0 N, 457449.3 E (NAD83)

ELEVATION: 40.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Daytona Beach, FL; Driller: A. Deghetani

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, NQ tools, NW/HW casing

00	·		<u> </u>	12141 . CIVIL 33 3/14 293203, Hidd Totally, 14Q (0013, 1444/1		o.i.ig	ONIENTATION: Vertical
WATER	LEVELS: 0.1	ft bg	s on 6	/3/07 START : 6/3/2007 END : 6/	6/200	7 LOGGER : D. Whitaker	
				DISCONTINUITIES	ניז	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
표원한	L'A ER'A	(%	FRACTURES PER FOOT		임	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
H A A	GTEN	(%) Q	FF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BO	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
925	SEC SEC	A Q	RA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ϋ́	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	074	IL.	шш		0)		
-129.5			>10	166.95, 167.2, 167.4, 167.6, 167.7, 167.85, 168.1, 168.7, 168.2, 168.3, 168.5, 168.95,	$\perp$	<b>Limestone</b> - 170.0-172.0' - light olive gray, (5Y	_
			10	169.05, 169.15, 169.17, 169.24, 169.3,		5/2), weak (R2), voids (<1/16") over	
-				169.44' - Bedding plane or mechanical break	┰	25% of surface, few cavities up to	-
-			>10		+	<ul> <li>3/8", poorly fossiliferous, secondary</li> </ul>	-
-				undulating, few are partings, tight to open		infill in voids over 10-20% of surface	-
	R21-NQ	0		1/2", sand to fine gravel-sized limestone fragments in fracture	$\vdash$	No Recovery 172.0-175.0'	
1 -	5 ft 40%	U		170.0-170.6, 171.0-171.2, 171.55-172.0' -			
-	.070			Fracture zone (3), fine to coarse angular to	ш	-	-
-			NR	subangular limestone fragments, 2% sand	$\pm \Box$	-	-
_				170.7, 170.95, 171.2, 171.3, 171.4, 171.55' -		<u>-</u>	
				Bedding plane or mechanical break (6), <10 deg, smooth, planar to undulating, open	Н		R21: 7 minutes
175	175.0			<1/2", sand in fractures			
-134.5	170.0			171.35' - Fracture, vertical, rough, planar	┧	 Limestone	
-			>10	175.0-175.1, 175.2-175.4, 176.55-176.81,	₽	<ul><li>175.0-177.8' - Same as 170.0-172.0'</li></ul>	-
1 -				177.1-177.5' - Fracture zone (4), fine to coarse angular to subangular gravel-sized	ш	except weak to medium strong rock	_
			>10	limestone fragments	$\vdash$	(R2-R3)	
-			>10	175.1, 175.2, 175.4, 175.85, 175.9, 175.55,	7		
-	R22-NQ			176.8, 177.3, 177.5' - Bedding plane (9),	$\blacksquare$	-	-
-	5 ft	8	>10	rough, undulating, sand/fine gravel in	+	-	_
_	56%			fractures, open up to 1" 176.2, 176.3' - Bedding plane (2), rough,		- No Recovery 177.8-180.0'	_
				undulating, little sand in fractures, open <1/4"		,	
-				andalamig, mas sama in mastares, sport	T		
-			NR			_	R22: 5 minutes
-					+	_	-
180	180.0				-Ш		
-139.5			>10	180.0-180.91' - Fracture zone, fine to coarse	$\vdash$	<b>Limestone</b> - 180.0-181.4' - Same as 170.0-180.0'	
			/10	gravel-sized angular to subrounded gravel	$\vdash$	except from 180.9-181.4'	
-			0	•	ш	fossiliferous with many molds and	<u> </u>
-					+	<ul><li>casts, voids (&lt;1/16") over 50-60% of</li></ul>	-
-						surface, many cavities up to 1"x1/2"	_
	R23-NQ 5 ft	9			Ш	No Recovery 181.4-185.0'	
	28%	9			Ш		
-			NR			-	1
-					╁┼┤	-	
-					Ш	-	Dag. Dunting out to a second
I _					$\prod$	_	R23: Runtime not recorded
185	185.0						12:00 Last rock core
-144.5						Bottom of Boring at 185.0 ft bgs on	completed, total depth is — \ 185.0' below ground
-					1	- 6/6/2007	\surface
-					-	-	
I -					]	<u> </u>	
I							
1 -					1		]
-					1	-	
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<u> </u>					+		
I							



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-04	SHEET	1	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723824.3 N, 457384.0 E (NAD83)

ELEVATION: 40.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

WATE	RLEVELS	: 5.2 ft bo	s on 5/31	1/2007 S	START : 5/31/2007 END : 6/1/2007 LC	GGER	: R.	McComb
				STANDARD	SOIL DESCRIPTION		ō	COMMENTS
A NO NO NO NO NO NO NO NO NO NO NO NO NO	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		ССО	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR	.	BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
40.0	0.0				Topsoil (OL)		7/1/	
	1	0.6	SS-1	2-4-5 (9)	0.0-0.6' - dark gray to grayish black, (N2 to N3), trac fine silica sand, abundant organic material	ce -	1/ 7	_
	1.5			(9)	inic cinca caria, accincant organic material	1	11/	1
								1
	1					1		
						]		
								_
						_		_
5_ 35.0	5.0				Olavara Carad (OO)		7777	
35.0	4			6-7-6	Clayey Sand (SC) 5.0-5.9' - moderate yellowish brown and dark			-
	4	0.9	SS-2	(13)	yellowish brown, (10YR 5/1 and 10YR 4/2), moist, medium dense, very fine to fine grained, silica sand	, -		-
	6.5				— 25-30% low to medium plastic fines, trace root	" / <del> </del>		-
	-				fragments	_/ -{		_
	-					-		-
	1					-		-
	1					-		-
	1					- 1		-
10	10.0					-		-
30.0	10.0				Silty Sand (SM)		Ш	_
	1	1.1	SS-3	7-9-12 (21)	10.0-11.05' - pale yellowish brown, (10YR 6/2), wet, medium dense, 20% nonplastic to low plastic fines,	, 1		_
	11.5			(21)	fine silica sand	1		1
								_
								_
						4		_
	4					4		_
	4					-		-
15 <u></u> 25.0	15.0				Silty Sand (SM)		717	
25.0	-	1.4	SS-4	6-8-10	15.0-16.4' - Same as 10.0-11.05'	-		-
	-	1.4	55-4	(18)		-		-
	16.5						<u> 111</u>	-
	1					-		-
1	1					-		-
1	1							-
1	1							_
1	1							_
20	1					- 1		
h	1	i						



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-04	SHEET	2	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723824.3 N, 457384.0 E (NAD83)

ELEVATION: 40.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

					TOOO75, mad rolary, cameac			_	OTHERTATION : Vertical
WATER	LEVELS	: 5.2 ft bo	gs on 5/3 <sup>-</sup>	1/2007 8		D: 6/1/2007	LOGGER	: R.	
>00				STANDARD	SOIL DE	SCRIPTION		დ	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COUL NAME LICOS O		_	SYMBOLIC LOG	DEDTIL OF CACING DRILLING DATE
H H H H		RECOVE	RY (ft)			ROUP SYMBOL, COLO		OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EVA EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL S			MB	INSTRUMENTATION
				(N)				တ်	
20.0	20.0			44 40 40	Silt Sand (SM) 20.0-21.2' - Same as 15.0	n-16 <i>4</i> '			
		1.2	SS-5	11-12-12 (24)	20.0-21.2 - Same as 13.0	5-10.4			
	21.5			(24)			1		
-	21.0							111	1
-	1						-		-
-	-						-		-
-	-						=		-
-							=		-
_							_		_
_									
25	25.0								
15.0					Silty Sand (SM)	2 04 01		Ш	
-	1	0.9	SS-6	5-4-5	25.0-25.9' - Same as 20.0	)-21.2'		Ш	]
-	26.5			(9)			-		-
-	26.5							111	-
-	-								-
-							-		-
-							_		-
_							_		_
l _									
30	30.0						1		1
10.0	00.0				Silty Sand (SM)			Ш	
-	-	1.5	SS-7	2-3-2	30.0-31.5' - Same as 25.0	0-25.9'	-	Ш	-
-		1.0	00 /	(5)			=		-
-	31.5						_	Ш	-
_	-						-		-
_							_		_
l _									
l _									
	1						1		
35	35.0						1		1
5.0	00.0				Sandy Lean Clay Or San	dy Organic Soil (CL-0	OL)	Ş	35.0-35.7' appears organic rich
-	1	1.4	SS-8	5-8-7	35.0-35.7' - dark gray to g	grayish black, (N3 to N	(2), <b>⊤t</b>	$\stackrel{\sim}{\sim}$	-
-	-	1.4	00-0	(15)	moist, stiff, low to medium 30% very fine silica sand	n plasticity, slow dilatal	ncy, /-		-
-	36.5				→ Silty Sand (SM)		—— ˈ <b>.</b>	111	-
-					35.7-36.4' - pale yellowish	brown mottled with d	ark /_		-
-					yellowish brown, (10YR 6 wet, medium dense, very	//2 mottled with 10YR 4	1/2),   ]		_
_	]				30-35% low plastic fines	mio to mio sinoa sana	'   <b>]</b>		
	]						1		]
-	1						1		]
40	1						- 1		1
40	-								
	1						l		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-04	SHEET	3	OF	a	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723824.3 N, 457384.0 E (NAD83)

ELEVATION: 40.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

WATER	LEVELS	: 5.2 ft bg	gs on 5/3 <sup>-</sup>	1/2007 S	START : 5/31/2007 END : 6/1/2007 LOGGER : R. McComb
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  SOMMETTO  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
BEL GE /		RECOVE	ERY (ft)	TEGTTIEGGETG	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH EVA-			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
SU ELE			,,,,,,	(N)	
0.0	40.0	0.8	SS-9	3-3-4 (7)	Sandy Organic Soil And Sandy Lean Clay (OL-CL) 40.0-40.8' - Same as 35.0-35.7' except grayish black, (N2), moist, medium stiff, low to medium plasticity, slow dilatancy, 30% very fine to fine silica sand
- - - -					
45	45.0				
-5.0 - -	46.5	1.5	SS-10	3-2-4 (6)	Silt And Sandy Organic Soil (ML-OL) 45.0-45.6' - moderate yellowish brown, (10YR 5/4), moist, medium stiff, nonplastic to low plasticity, rapid dilatancy, contact between lithologies abrupt and inclined; 70% ML, 30% OL, trace very fine silica sand,
-					OL is grayish black (N2), moist, medium stiff, low to medium plastic, slow to rapid dilatancy, 20% very fine to fine silica sand  Clayey Sand (SC)  45.6-46.5' - grayish black, (N2), wet, loose, very fine
50	50.0				to fine grained silica sand, 25-30% low to medium plastic fines
-10.0 -	51.5	1.2	SS-11	30-40-45 (85)	Silt (ML) 50.0-51.2' - moderate yellowish brown, (10Y 5/4), wet, hard, low plasticity, rapid dilatancy, mild HCl reaction, trace fine grained sand, carbonate material
-					Driller's Remark: hard drilling at 53.5'
- - - 55	55.0				- Dillet's Heriain. Haid dilling at 33.3
-15.0 -15.0	56.5	1.1	SS-12	8-5-12 (17)	Silty Sand With Limestone (SM) 55.0-56.1' - moderate yellowish brown, (10YR 5/4), wet, medium dense, fine to coarse grained, mild HCI reaction, 20-25% low plastic fines, 25% fine gravel-sized limestone fragments, carbonate
-					materials
60					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-04	SHEET	4	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723824.3 N, 457384.0 E (NAD83)

ELEVATION: 40.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 5.2 ft bo	gs on 5/31	/2007	START : 5/31/2007 END : 6/1/2007 LOGGEF	R : R.	McComb
				STANDARD	SOIL DESCRIPTION	ű	COMMENTS
AND N (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISCS COOLID SYMBOL COLOD	SYMBOLIC LOG	DEPTH OF CASING IDDILLING DATE
H BE ACE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	BOLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMI	INSTRUMENTATION
-20.0	60.0	0.0	00.40	25-50/5.5	Silty Sand With Limestone (SM)	Ш	Driller's Remark: Depth to water 5.2' below
	61.0	0.9	SS-13	(75/11.5")	60.0-60.9' - Same as 50.0-51.2' except 35-40% fine gravel-sized limestone fragments		ground surface
_					_		_
_					-		_
_					-	-	_
-					-	-	-
-					-	1	-
65	CE O				<del>-</del>	1	-
-25.0	65.0 65.3	0.1	SS-14	50/3	☐ Limestone Fragments		╡
-				(50/3")	65.0-65.1' - dark yellowish brown, (10YR 4/2), mild HCl reaction, some black organic staining on bedding	1	1
-					planes	1	Driller's Remark: soft drilling at 66.67',
					_		Rig chatter at 67.0' harder drilling
_					_	1	_
-					-		_
-					-	ł	-
					-	ł	-
70 <u> </u>	70.0			26-50/3	Sandy Silt And Limestone Fragments (ML)	НΠ	-
-	70.8	0.7	SS-15	(76/9")	70.0-70.7' - pale yellowish brown, (10YR 6/2), wet, − hard, low plasticity, rapid dilatancy, mild HCl reaction,	Ш	-
-					\ 40% ML and 60% limestone, 25-30% fine to coarse	l	-
-					\sand-sized; fine to coarse gravel-sized limestone   fragments, carbonate materials	1	1
					_		
_					_		_
-					-	-	_
-					-	-	-
75 <u> </u>	75.0				Silty Sand With Limestone (SM)	111	-
-		0.8	SS-16	50-37-27	75.0-75.75' - moderate yellowish brown, (10YR 5/4), -		
-	76.5	0.0		(64)	moist, very dense, fine to coarse grained, mild HCl reaction, 35-40% low plastic fines, 15% fine		-
-	10.0				gravel-sized limestone fragments, carbonate materials		1
-					_	1	1
					_	]	]
	80.0					$oxed{oxed}$	
_	80.1	0.0	(SS-17)	50/1 (50/1")	No Recovery 80.0-80.1'	Γ	]
-				, ,	-	-	-
80					Begin Rock Coring at 80.0 ft bgs	⊢	
					See the next sheet for the rock core log		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-04 SHEET 5 OF 9

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723824.3 N, 457384.0 E (NAD83)

ELEVATION: 40.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS : 5.2	2 ft bg	s on 5	/31/2007 START : 5/31/2007 END : 6/	1/200	7 LOGGER : R. McComb	
<b>₹</b> ₽₽	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-40.0 -	80.0	ш.	3	80.15' - Bedding plane, horizontal, smooth, open 80.35' - Fracture, 30 deg, rough, stepped,		Limestone Fragments  - 80.0-81.35' - light olive gray, (5Y 5/2), moderate HCl reaction, very	Switching over to NQ coring at 80.0'
- -	R1-NQ 5 ft 46%	8	4	black organic film over 15-20%, tight 80.6' - Fracture, 50-60 deg, rough, undulating, tight 81.03' - Fracture, 0-80 deg, rough, stepped, tight		weak to weak (R1 to R2), fossiliferous (voids, casts, molds), voids up to 1/16", some cavities generally <6/16"x6/16"  Limestone 81.35-82.3' - pale greenish yellow,	- - -
-			NR	81.35' - Bedding plane, horizontal, smooth, stepped, open 81.67, 81.8' - Bedding plane, horizontal, smooth, open 82.2' - Bedding plane, horizontal, smooth, open		(10Y 8/2), fine to very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), <2% voids and cavities, variegated color with contact at 81.9' No Recovery 82.3-85.0'	R1:7 minutes
85 <u> </u>	85.0		1	-		Limestone  85.0-90.0' - yellowish gray with pale greenish yellow mottling, (5Y 7/2 with	-
-	Do NO		1	85.9' - Fracture or mechanical break, horizontal, rough, undulating, tight 86.6-87.75' - Fracture zone, vertical, rough, undulating, tight		10Y 8/2), fine grained, mild HCl reaction, very weak to weak (R1 to R2), lithoclasts like fractures at 86.0-86.4' and 87.0-87.4' (light	Core fell out upon retrieval, had to make multiple trips - to get rock out of outer barrel
- -	R2-NQ 5 ft 100%	44	2			<ul> <li>colored limestone with few voids);</li> <li>fossiliferous (casts and molds), voids</li> <li>and cavities up to 3/8"-3/4"x3/8" over</li> </ul>	No circulation below 80.0'
-			3	88.4-88.8' - Fracture zone, 0-<5 deg, rough, undulating, tight to open 89.15-89.3' - Fracture zone, 0-90 deg,		- 40-50% of surface -	R2:5 minutes
90_ -50.0	90.0		1	Undulating to stepped, tight to open 89.6' - Fracture, 0-90 deg, rough, Undulating — to stepped, open		90.0-90.9' - mottled yellowish gray to light olive brown, (5Y 7/2 to 5Y 5/6),	
- -			0	90.7' - Fracture, <5 deg, rough, undulating, tight		fine to very fine grained, mild to moderate HCl reaction, very weak (R1), fossiliferous (molds/casts) with very fine grained yellowish gray	- -
- -	R3-NQ 5 ft 100%	90	0			possible intraclasts in the structure, voids and cavities up to 3/16"-3/8" over 50-60% of surface	- - -
-			1	93.4' - Bedding plane, horizontal, rough, undulating, tight		90.9-92.0' - very light gray mottled  medium gray with dusky yellow to moderate olive brown, (N8 mottled with N6 with 5Y 6/4 to 5Y 4/4), very	R3:9 minutes
95_ -55.0	95.0		2	94.6' - Fracture, horizontal, rough, undulating, tight	Ħ	<ul> <li>fine grained, strong HCl reaction, weak (R2), &lt;2% cavities, voids up to 3/16" over 15-20% of rock surface</li> </ul>	-
-			0	94.9' - Fracture, horizontal, rough, undulating, tight 95.2' - Bedding plane, horizontal, smooth, undulating, open		<ul> <li>92.0-93.4' - Same as 90.9-92.0'</li> <li>except pale yellowish brown to light</li> <li>olive brown, (10YR 6/2 to 5Y 5/6),</li> <li>mottled, very fine grained, mild to</li> </ul>	
-	R4-NQ 5 ft	74	1	97.5' - Bedding plane, <5 deg, rough,		moderate HCl reaction, cavities and voids more common than above with some cavity infilling (strong HCl	
-	90%		2	undulating, open 98.5' - Bedding plane, horizontal, smooth,		reaction), cavities and voids up to - 20-25% = 93.4-95.0' - Same as 90.9-92.0' - except voids up to 20-25%	- -
100	100.0		10 NR	undulating, open, organic material 98.8' - Fracture, 20 deg, rough, undulating, tight		-	R4:9 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-04	SHEET	6	OF	9	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723824.3 N, 457384.0 E (NAD83)

ELEVATION: 40.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

DEPTH BELOW SURFACE AND ELEVATION (ft)	I, ND Y (%)			DISCONTINUITIES	1	LITHOLOGY		
H BELOV ACE ANI ATION (f					ပ္ထ	LITHOLOGY	COMMENTS	
DEPTI SURF, ELEV	SURFACE AND ELEVATION (ft) CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.	
-60.0 	R5-NQ 5 ft 88% 105.0	37	10 4 4 1 10 NR	99.35' - Fracture zone, 0-90 deg, rough, Undulating to stepped, open 100.0-100.3' - Fracture zone, 0-90 deg, smooth, open 100.7-100.9' - Fracture, 70 deg, rough, undulating, tight 101.2, 101.3' - Bedding plane (2), horizontal, smooth, undulating, open, black organic staining over 35% 101.8-102.5' - Fracture zone, 0-90 deg, rough, Stepped to undulating, open to tight 102.65, 102.8, 102.98, 103.17' - Bedding plane (4), 0-<5 deg, rough, undulating, open 104.1-104.4' - Fracture zone, 0-90 deg, open		Limestone 95.0-98.4' - variegated light olive brown to yellowish gray, (5Y 5/6 to 5Y 7/2), fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), fossiliferous (mold/casts) with some organic fossiliferous particles at 95.4-95.7'; becoming interspaced with very fine grained limestone with depth, voids (up to 1/16") and cavities (up to 3/8"-3/4"x3/8") over 20-25% of surface  Clay (CL) 98.4-98.45' - dark gray, (N3), strong	R5:6 minutes	
-65.0	R6-NQ 5 ft 74%	33	4 1 10 NR	105.12' - Bedding plane, 0-<5 deg, smooth, Planar to stepped, open 105.3-105.95' - Fracture zone, 0-<5 deg, smooth, planar, open, fracture extending total length, extends from one side of contacts to the other side 105.95' - Bedding plane, horizontal, smooth, planar, tight to open 106.3' - Fracture, 30-40 deg, rough, stepped, tight 106.5, 106.7, 106.95' - Bedding plane (3), horizontal, smooth, undulating, tight to open 107.85' - Fracture, 0-90 deg, rough, stepped, tight 108.2' - Bedding plane, <5 deg, rough,		HCl reaction, platy  Limestone  98.45-99.5' - very light gray, (N8), very fine grained, strong HCl reaction, weak (R2), some fossil voids and casts over 10% of surface No Recovery 99.5-100.0'  Limestone  100.0-104.4' - yellowish gray, (5Y 8/1), fine to very fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), trace fossils as molds and casts, voids 3/8"x3/4" over 10-15% of surface, cavities <2% less than 3/8"x3/8",		
-70.0 	R7-NQ 5 ft 98%	78	0 0 0 1	113.9' - Bedding plane, horizontal, rough, undulating, open 113.9-114.1' - Fracture, vertical, rough, undulating, open		chalk-like texture, becoming very soft, extremely weak (R0) at 104.0', thick, laminated from 101.2-101.3' with some black organic material No Recovery 104.4-105.0' Limestone  105.0-108.7' - yellowish gray, (5Y 8/1), very fine grained, strong HCI reaction, very weak to weak (R1 to R2), fossiliferous (molds and casts), transition from trace to 20% increasing with depth, void and cavities ranging from <5% to 15-20% with depth, some original fossil material (echinoids) at 108.4-108.7' No Recovery 108.7-110.0'	R7:7 minutes	
-73.0 - - - - - - - - - - - - - - -	R8-NQ 5 ft 86%	74	2 0 1 3 NR	114.1' - Bedding plane, 0-30 deg and 30 deg, rough, undulating, open 114.5' - Bedding plane, horizontal, rough, planar, open 114.6-114.9' - Fracture zone, horizontal, rough, planar, limestone fragments, open 115.1' - Fracture zone, smooth, planar and undulating, limestone fragments 115.25, 117.55, 118.18, 118.53, 118.55, 119.3' - Bedding plane (6), smooth, undulating to planar, open		Limestone 110.0-113.3' - yellowish gray, (5Y 8/1 to 5Y 7/2), very fine grained, strong HCl reaction, very weak to weak (R1 to R2), color transition at 112.2', voids (up to 1/16") over 5-10% of surface, fossiliferous casts/molds of original material (echinoids) suspended in matrix 113.3-114.9' - Same as 110.0-113.3' except cavities and voids more common covering 30-40% of surface, echinoids rare to absent No Recovery 114.9-115.0'		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-04

SHEET 7 OF 9

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723824.3 N, 457384.0 E (NAD83)

ELEVATION: 40.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

ORIENTATION : Vertical CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing WATER LEVELS: 5.2 ft bgs on 5/31/2007 START: 5/31/2007 END: 6/1/2007 LOGGER: R. McComb DISCONTINUITIES LITHOLOGY COMMENTS 90 CORE RUN, LENGTH, AND RECOVERY (%) DEPTH BELOW SURFACE AND ELEVATION (ft) FRACTURES PER FOOT **DESCRIPTION** ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND AND ROCK MASS DROPS, TEST RESULTS, ETC. THICKNESS, SURFACE STAINING, AND TIGHTNESS CHARACTERISTICS -80.0 120-120.35' - Fracture, vertical, smooth, Limestone 115.0-119.3' - yellowish gray to very 4 pale orange, (5Y 8/1 to 10YR 8/2), . 120.35' - Fracture, 40 deg, rough, undulating, very fine grained, strong HCI tiaht reaction, very weak to weak (R1 to R2), "chalk-like" texture, zones 2 120.55' - Fracture, 0-60 deg, smooth, planar, open 120.75' - Bedding plane, horizontal, where voids and cavities are nearly R9-NQ undulating, open 24 7 absent grades to zones/thin beds 5 ft with voids up to 1/16" covering 121.35' - Bedding plane, horizontal, smooth, 88% 20-30% (e.g. 116.1-116.2') cavities, stepped, tight 121.97, 122.25, 122.37, 122.7, 122.77 8 <2% (more abundant near beginning 122.87, 123.0, 123.15, 123.4, 123.5, 123.55, of run, up to 3/8"x3/8"); fossil void to 123.63, 123.7, 123.82, 123.88, 123.9, 140.1, rate, becoming slightly more R9.5 minutes 4 140.2, 140.3, 140.45' - Bedding plane (20), common at base of run NR horizontal, rough, undulating to stepped, No Recovery 119.3-120.0' 125 125.0 Limestone 120.0-122.7' - Same as 115.0-119.3' -85 0 6 122.7-124.4' - Same as 120.0-122.7' except more voids/cavities up to 126.51, 126.65, 126.72, 126.90, 127.15, 127.25, 127.35, 127.48, 127.7, 127.78, 127.92, 128.0, 128.07' - Bedding plane or 75-80% of surface covered with 8 voids 1/16", cavities up to 3/8"-3/4"x3/8"-3/4", fossiliferous mechanical break (23), horizontal, rough, R10-NO (molds/casts) 8 undulating to stepped, open 25 5 ft 90% No Recovery 124.4-125.0' Limestone 125.0-129.3' - Same as 122.7-124.4' 1 except some thin laminations at base R10:7 minutes 2 129.3' - Bedding plane, 10-15 deg, smooth, 129.3-129.5' - yellowish gray, (5Y NR 7/2), fine grained, strong HCI 130 130.0 planar, tight 129.48' - Bedding plane, <5 deg, smooth, reaction, medium strong (R3), -90.0 laminated bedding, thick, laminae stepped, open 3 130.25, 130.58, 130.9, 131.2, 131.28, 131.5, incline 10-15 deg, 1 cavity 131.55, 131.64, 131.78, 131.97, 132.13, 132.35, 132.42, 132.47, 132.68, 132.92, 3/8"x3-7/8", voids less than 1/16" over 10-15% of surface, dense 7 132.97, 133.05' - Bedding plane (18), limestone No Recovery 129.5-130.0' horizontal, smooth, undulating to planar, R11-NO Limestone 130.0-133.5' - yellowish gray, (5Y 7 8 5 ft 70% 8/1), strong HCl reaction, weak to 2 very weak (R2 to R1), voids up to 1/16" or less over 5-10% of surface, rare cavities (3/16"x3/16"), trace NR R11:7 minutes fossil molds/casts; thin lamination in upper 0.1-0.2' of section 135 135.0 No Recovery 133.5-135.0' -95.0 135.1, 135.2' - Bedding plane (2), horizontal, Limestone 5 smooth, undulating, open 135.0-139.5' - Same as 130.0-133.5' 135.3' - Bedding plane or fracture, 0-60 deg, except cavities and voids more rough, stepped to undulating, open except carries and voices more frequent becoming fine to medium grained at 166.67' with some fossils, cavities becoming common with depth up to 3/8"-3/4"x3/8", some 7 135.5-136.65' - Fracture zone, 0-90 deg, smooth, undulating, gravel 136.72,136.82, 136.92, 137.05, 137.27, R12-NQ 0 5 5 ft 137.5' - Bedding plane (6), horizontal, rough, mottling (coating of limestone matrix) 90% undulating, open becoming extremely weak rock (R0) 137.6' - Bedding plane or fracture, 0-50 deg, at 138.4' to 139.0', thick laminated >10 smooth, undulating, open 138.04, 138.25, 138.4' - Bedding plane (3), from 138.0-139.5', few voids horizontal, rough, undulating, open 138.4-139.0' - Fracture zone, 0-90 deg, R12:7 minutes 2 No Recovery 139.5-140.0' NR 140 140.0 smooth to rough, undulating to stepped, open



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338884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723824.3 N, 457384.0 E (NAD83)

ELEVATION: 40.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing

ORIENTATION : Vertical

WATER	LEVELS : 5.2	ft bgs	s on 5/	31/2007 START : 5/31/2007 END : 6/	1/200	LOGGER : R. McComb	
≥∩≘	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ACE ATIO	E RUI	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	JOCIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EN EN	ORE	Ø	RAC ER F	PLANARITÝ, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	028	œ	E 6		Ś		
-100.0			5	139.25' - Bedding plane, horizontal, rough, stepped to undulating, open		Limestone - 140.0-144.2' - variegated yellowish	_
l _				140.3, 140.42, 140.6, 140.75, 140.95' -	oxdot	gray with gray laminae, (5Y 8/1 to 5Y	_
l _			6	Bedding plane or mechanical break (5), horizontal, smooth, planar to undulating	」	9/2), very fine to fine grained, strong  HCl reaction, weak to very weak (R2	
			١	141.18, 141.28, 141.33, 141.39, 141.5, 141.8'		to R1), voids and cavities, 3-5%	
	R13-NQ		•	- Bedding plane or mechanical break (6), horizontal, smooth, planar to undulating		becoming 10-15% with depth, fossiliferous with trace echinoids in	
-	5 ft 84%	10	6	142.0, 142.08, 142.18, 142.46, 142.75, 142.9'		top portion, molds and casts increase	1
_				- Bedding plane or mechanical break (6),	╙	with depth (5-10%), thick laminated	1
-			6	horizontal, smooth, planar to undulating 143.05, 143.13, 143.65, 143.88, 143.95,	ш	– 133.9-134.0'	1 1
-			2	143.98' - Bedding plane or mechanical break	ш	No Decement 444 2 445 01	R13:6 minutes
145	145.0		NR	(6), horizontal, rough, planar to undulating 144.08, 144.18' - Bedding plane or	$\vdash$	No Recovery 144.2-145.0'	
-105.0	145.0			mechanical break (2), horizontal, rough,	F	Limestone	-
-			>10	planar to undulating 145.0-147.25' - Fracture zone, 0-90 deg,		- 145.0-147.1' - light gray to medium	1
-				limestone gravel, stepped, undulating,	$oldsymbol{oldsymbol{\sqcup}}$	gray, (N7 to N6), very fine grained, strong HCl reaction, medium strong	-
-			>10	smooth to rough, open	口	<ul> <li>(R3), fossiliferous (molds and casts)</li> </ul>	1
-	R14-NQ				Ш	over 3-5%, voids up to 1/16" over 3-5% of surface	1 -
-	5 ft	10	10	147.25' - Bedding plane, horizontal, rough,	+	<ul><li>147.1-149.2' - yellowish gray grading</li></ul>	1 -
-	84%			undulating, open 147.3, 147.45, 147.52, 147.92, 148.0, 148.05,		to medium gray with depth, (5Y 7/2 to N5), fine grained, mild to moderate	-
-			7	148.24, 148.65' - Bedding plane (8), 0-<5		HCl reaction, thinly laminated in	1 -
-				deg, undulating to planar, rough to smooth, some organic black coating over 70-80% of	$oxed{\bot}$	upper 0.5', trace fossil molds/casts, 1	
_			\_1_/ NR	surfaces	ш	cavity 3/8"x2", voids up to 1/16" over 15-20% of surface, some dissolution	R14:6 minutes
150	150.0		IVIX	148.65-148.90' - Fracture zone	Н	features (cavities) at 148.2' as	
-110.0			1		$\vdash$	discontinuous bedding plane voids No Recovery 149.2-150.0'	_
_				450 OL Dadding plans hadroutel growth		Limestone	
_			0	150.9' - Bedding plane, horizontal, rough, undulating		150.0-150.9' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine	
			U	g		grained, moderate to mild HCI	1
_	R15-NQ		_		ш	reaction, medium strong (R3), becomes thinly laminated with depth,	1
_	5 ft 100%	90	1	152.55' - Bedding plane, horizontal, rough,	$\Box$	voids up to 1/16" over 30-40% of	1
-				undulating, tight	$\vdash$	surface with trace thin laminae of very fine limestone with few voids	1
-			14	153.25-153.4' - Fracture zone, 0-90 deg, rough	Ħ	150.9-151.8' - variegated yellowish	1
-				153.5' - Bedding plane or fracture, horizontal,	╁	gray, dusky yellow to light olive	R15:6 minutes
155	155.0		1	rough, planar, open 153.5-153.85' - Fracture, 80-90 deg, rough,	F	brown, (5Y 7/2, 5Y 6/4 to 5Y 5/6), coarse grained, strong HCl reaction,	
-115.0	133.0			undulating, tight —	口	— weak (R2), abundant possible	-
-			0		╁	Limestone	-
-				156.4, 157.15, 157.25, 157.33, 157.52,	厂	<ul> <li>151.8-153.3' - dusky yellow to</li> </ul>	-
-			1	157.65, 157.73, 157.96' - Bedding plane (8),	亡	yellowish gray, (5Y 6/4 to 5Y 7/2), medium grained, weak (R2)	-
-	R16-NQ - 5 ft - 98%			0-<5 deg, rough, undulating, open to tight	世	- 153.3-155.0' - Same as 150.0-150.9'	-
-			7		F	except thinly laminated, voids up to 1/16" over 5-10%, mild to strong HCl	-
-				158.0, 158.15, 158.22' - Bedding plane (3),	仜	<ul> <li>reaction with depth, some early</li> </ul>	-
-			3	horizontal, smooth, undulating, open	$\vdash$	fracture development/dissolution at 154.7'	R16:8 minutes
-				159.1' - Bedding plane, 0-<5 deg, rough, undulating, open	F	-	1 1 1 0 .0 11 III lules
-			2	159.5' - Fracture, 50 deg, rough, stepped,		-	Actual Not Recovered
160	160.0		NR	tight	$\vdash$		interval from 159.9-160.0'
1					1		ı



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-04	SHEET	9	OF	9

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723824.3 N, 457384.0 E (NAD83)

ELEVATION: 40.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

				12141 . CIVIE 330 3/14 100073, ITING TOTALLY, TW		Juo	9	ONENTATION: Vertical
WATER	LEVELS: 5.2	2 ft bgs	s on 5	/31/2007 START : 5/31/2007	END: 6/1	/200	7 LOGGER : R. McComb	
				DISCONTINUITIES		(D	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION		SYMBOLIC LOG	DOOK TYPE COLOR	1
SEL ON	Z, Z, Z	<u> </u>	FRACTURES PER FOOT	DESCRIPTION		2	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
ATI	IN TES	(%) Q	Įξ	DEPTH, TYPE, ORIENTATION, ROUGI	HNESS,	泛	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
무류의	SING	οD	SAC ER F	PLANARITY, INFILLING MATERIAL	AND	Æ	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	822	œ	FR	THICKNESS, SURFACE STAINING, AND T	IIGHTNESS	ŝ	CHARACTERISTICS	Brior of Teor Redero, Ero.
							Limestone	
-					-		- 155.0-157.25' - variegated yellowish	-
_					-		gray to light gray brownish gray, (5Y	-
					_		7/2 to N7), fine grained, mild to moderate HCl reaction, medium	
					_		strong to weak (R3 to R2),	
-					-		competent, becoming thinly	-
1 -					-		laminated with depth, fossil casts and	_
					_		molds over 5-10%, voids 10-15%,	_
							cavities 1/16"x3/16" showing	
_					-		alteration coloring, transitioned to lithology below, becoming light olive	1
-					-		brown in color	-
					_		157.25-158.2' - variegated yellowish	
							gray to light olive brown to moderate	
1 7							brown, (5Y 7/2 to 5Y 5/2 to 5Y 4/4),	
-					-		fine to medium grained, mild to	-
-					-		moderate HCl reaction, weak (R2), competent, very thinly laminated with	-
					_		possibly organic material, trace	_
							fossils, some voids and cavities over	
1 -					-		10-15% of surface	_
-					-		_ 158.2-159.1' - yellowish gray, (5Y	-
l _					_		7/2), some medium gray (n7-n8) mottling, fine grained, mild HCl	_
							reaction, weak to medium strong (R2	
I -					_	1	to R3), competent, voids up to 1/16"	1
-					-		over 2-3%, several cavities	-
_					_		_   3/16"x3/8" over <1%, fossiliferous	_
							(<1%), casts/molds (echinoids)	
1 7							159.1-159.9' - yellowish gray to light olive brown, (5Y 7/1 to 5Y 8/1), fine	
-					-		to medium grained, moderate to	-
-					-		strong HCl reaction, weak (R2),	_
l _					_		fossiliferous, voids/cavities over	_
							10-15% of surface	
					-	1	No Recovery 159.9-160.0'	
-					-		Bottom of Boring at 160.0 ft bgs on 6/1/2007	-
_					-		- 0/1/2007	_
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-05 SHEET 1 OF 10

### **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723689.4 N, 457584.8 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 5-7/8" tri-cone bit ORIENTATION : Vertical

DRILLIN	IG ME I H	OD AND	EQUIPIVI	ENT DIEURCH D-	50 S/N 232, mud rotary, cathead, NWJ rods, 5-7/8" tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 1.2 ft bo	gs on 5/5/	07 5	START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki
				STANDARD	SOIL DESCRIPTION O COMMENTS
A P P P P P P P P P P P P P P P P P P P	SAMPLE	INTERVA	⊥ (ft)	PENETRATION TEST RESULTS	O T O
E SE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
림양핔				(N)	
41.3	0.0			1-2-3	Topsoil \( \) 0.0-0.2' - olive black, (5Y 2/1), roots, organics \( \) 10:59 Begin drilling
l _		1.2	SS-1	(5)	Poorly Graded Sand With Organics (SP)
_	1.5			` '	0.2-1.2' - pale yellowish brown grading to moderate yellowish brown at 0.95', (10YR 6/2 to 10YR 5/4), (manual with NWJ rod)
_					moist, loose, very fine to fine silica sand, trace
_					nonplastic fines, 15% organics decreasing with depth
_					]
l _					]
l _					]
<u> </u>					]
5	5.0				]
36.3					Silty Sand (SM)
	1	0.9	SS-2	3-2-2 (4)	5.0-5.9' - pale yellowish brown to light olive gray, (10YR 6/2 to 5Y 6/1), moist to wet, very loose, very
-	6.5			(4)	\fine to fine silica sand, 25% nonplastic fines,
-					\becoming low plastic at 5.7'
-	1				1 1
-	1			ļ.	1 1
-	1			ļ.	1 1
-	1				1 1
-	1			ļ.	1 1
10	10.0			ļ.	1 1
31.3	10.0				Silt (ML)
-	1	0.9	SS-3	8-14-18	10.0-10.91' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction,
-	11.5			(32)	\(\sigma_{\text{5-10\% very fine sand-sized, carbonate materials}\)
-	11.5				
-	1				
-	1				
-	-				- 1
-	1				- 1
-	1				- 1
	1			ļ.	- 1
15 <u> </u>	15.0 15.3	0.2	SS-4	50/3	Poor Recovery Limestone Fragments
-	-	<u> </u>		(50/3")	/ \ 15.0-15.2' - grayish orange, (10YR 5/4), moderate / -
-	-				HCl reaction, fragments up to 1/2"
-	-				- 1
-	-				- 1
-	-				- 1
-	-				1
-	-				
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-	-			ļ.	
20					



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-05	SHEET	2	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723689.4 N, 457584.8 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 5-7/8" tri-cone bit ORIENTATION: Vertical

Solid Description   Soli	WATER	LEVELS	: 1.2 ft bo	ıs on 5/5/	07 5	START : 5/4/2007 END : 5/6/2007 LOGGE	R : N	I. Jarzyniecki
21.3 20.0 1.2 SS-5 28-42-36 (78) 20-21 2- dusky yellow to grayish orange, (5Y 6/4 to 10 / 10 / 10 / 10 / 10 / 10 / 10 / 10	>00				STANDARD	SOIL DESCRIPTION	ي ا	COMMENTS
21.3 20.0 1.2 SS-5 28-42-36 (78) 20-21 2- dusky yellow to grayish orange, (5Y 6/4 to 10VR 7/4), wet, nonplastic, rapid dilatancy, moderate HCI reaction, 10-15% very fine to medium sand-sized, carbonate materials  25 25.0 1.0 SS-6 32-30-25 (55) 25.0 25.0 26.0 - grayish yellow, (5Y 8/4), wet, very dense, moderate HCI reaction, fine to coarse sand-sized, 30% nonplastic fines, 10-15% fine gravel-sized limestone, carbonate materials  30 30.0 11.3 1.0 SS-7 33-28-23 (51) 30.0-31.0 - Same as 25.0-26.0   31.5 35.0 8.3 35.0 8.3 35.0 8.3 35.0 8.3 35.0 8.3 35.0 8.3 35.0 35.0 58.5 Same as 30.0-31.0 except dark, yellowish orange (10YR 6/6 to 10YR 7/4), midl HCI reaction, 30% fine to coarse	ANE (ft.)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISOS CROLIR SYMBOL COLOR		DEDTH OF CASING DOULING DATE
21.3 20.0 1.2 SS-5 28-42-36 (78) 20-21 2- dusky yellow to grayish orange, (5Y 6/4 to 10VR 7/4), wet, nonplastic, rapid dilatancy, moderate HCI reaction, 10-15% very fine to medium sand-sized, carbonate materials  25 25.0 1.0 SS-6 32-30-25 (55) 25.0 25.0 26.0 - grayish yellow, (5Y 8/4), wet, very dense, moderate HCI reaction, fine to coarse sand-sized, 30% nonplastic fines, 10-15% fine gravel-sized limestone, carbonate materials  30 30.0 11.3 1.0 SS-7 33-28-23 (51) 30.0-31.0 - Same as 25.0-26.0   31.5 35.0 8.3 35.0 8.3 35.0 8.3 35.0 8.3 35.0 8.3 35.0 8.3 35.0 35.0 58.5 Same as 30.0-31.0 except dark, yellowish orange (10YR 6/6 to 10YR 7/4), midl HCI reaction, 30% fine to coarse	H BE ACE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR	ğ	DRILLING FLUID LOSS, TESTS, AND
21.3 20.0 1.2 SS-5 28-42-36 (78) 20-21 2- dusky yellow to grayish orange, (5Y 6/4 to 10VR 7/4), wet, nonplastic, rapid dilatancy, moderate HCI reaction, 10-15% very fine to medium sand-sized, carbonate materials  25 25.0 1.0 SS-6 32-30-25 (55) 25.0 25.0 26.0 - grayish yellow, (5Y 8/4), wet, very dense, moderate HCI reaction, fine to coarse sand-sized, 30% nonplastic fines, 10-15% fine gravel-sized limestone, carbonate materials  30 30.0 11.3 1.0 SS-7 33-28-23 (51) 30.0-31.0 - Same as 25.0-26.0   31.5 35.0 8.3 35.0 8.3 35.0 8.3 35.0 8.3 35.0 8.3 35.0 8.3 35.0 35.0 58.5 Same as 30.0-31.0 except dark, yellowish orange (10YR 6/6 to 10YR 7/4), midl HCI reaction, 30% fine to coarse	DEPT SURF ELEV			#TYPE		CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYME	INSTRUMENTATION
25. 25.0  10. SS-6 32-30-25 (55)  26.5 10. SS-7 33-28-23 (51)  1.0 SS-7 33-28-23 (51)  1.0 SS-7 33-28-23 (51)  1.0 SS-8 (28-30-50/5 (80/11*))  25. 35.0 36.3 35.0 0.9 SS-8 (28-30-50/5 (80/11*))  25. 35.0 36.9 SS-8 (28-30-50/5 (80/11*))  25. 35.0 36.9 SS-8 (28-30-50/5 (80/11*))  25. 35.0 36.9 SS-8 (28-30-50/5 (80/11*))  25. 35.0 36.9 SS-8 (28-30-50/5 (80/11*))  25. 35.0 36.9 SS-8 (28-30-50/5 (80/11*))  25. 35.0 36.9 SS-8 (28-30-50/5 (80/11*))  25. 35.0 36.9 SS-8 (28-30-50/5 (80/11*))  25. 35.0 36.9 SS-8 30.0 31.0 **except dark view of the course of the cours	21.3	20.0			(/	Silt (ML)	П	
25	-		1.2	SS-5		10YR 7/4), wet, nonplastic, rapid dilatancy, moderate	111	1
25 25.0 16.3  1.0 SS-6 32-30-25 (55)  26.5 10 SS-6 32-30-25 (55)  26.5 26.6 (95)  30 30.0  1.0 SS-7 33-28-23 (51)  31.5 1.0 SS-7 33-28-23 (51)  35 35.0 35.0 SS-7 (51)  36.4 28-30-50/5 (80/11*)  37 38-4 28-30-50/5 (80/11*)  38 35 35.0 SS-8 28-30-50/5 (80/11*)  39 30 30 30 30 30 30 30 30 30 30 30 30 30	-	21.5			(70)	HCl reaction, 10-15% very fine to medium sand-sized,	╨	4
16.3  1.0 SS-6  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  330 nonplastic fines, 10-15% fine gravel-sized limestone, carbonate materials  1.0 SS-7  33-28-23 (51)  31.5  35.0  35.0  35.0  35.0  35.0  35.0  36.3  0.9 SS-8  28-30-50/5 (80/11")  36.4  37.0  38.4  38.4  38.4  38.4  38.4  39.5  38.4  39.5  38.4  31.5  31						Carbonate materials	]	
16.3  1.0 SS-6  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  330 nonplastic fines, 10-15% fine gravel-sized limestone, carbonate materials  1.0 SS-7  33-28-23 (51)  31.5  35.0  35.0  35.0  35.0  35.0  35.0  36.3  0.9 SS-8  28-30-50/5 (80/11")  36.4  37.0  38.4  38.4  38.4  38.4  38.4  39.5  38.4  39.5  38.4  31.5  31	_						⇃	_
16.3  1.0 SS-6  26.5  1.0 SS-6  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  330 nonplastic fines, 10-15% fine gravel-sized limestone, carbonate materials  1.0 SS-7  33-28-23 (51)  31.5  35.0  6.3  0.9 SS-8  28-30-50/5 (80/11")  36.4  37.5  38.4  38.4  38.4  38.4  38.5  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand With Limestone (SM) 35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange, (10YR 6/6 to yellowish orange, 10YR 7/4), mild HCl reaction, 30% fine to coarse	-						1	1
16.3  1.0 SS-6  26.5  1.0 SS-6  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  330 nonplastic fines, 10-15% fine gravel-sized limestone, carbonate materials  1.0 SS-7  33-28-23 (51)  31.5  35.0  6.3  0.9 SS-8  28-30-50/5 (80/11")  36.4  37.5  38.4  38.4  38.4  38.4  38.5  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand With Limestone (SM) 35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange, (10YR 6/6 to yellowish orange, 10YR 7/4), mild HCl reaction, 30% fine to coarse	_						4	-
16.3  1.0 SS-6  26.5  1.0 SS-6  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  330 nonplastic fines, 10-15% fine gravel-sized limestone, carbonate materials  1.0 SS-7  33-28-23 (51)  31.5  35.0  6.3  0.9 SS-8  28-30-50/5 (80/11")  36.4  37.5  38.4  38.4  38.4  38.4  38.5  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand With Limestone (SM) 35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange, (10YR 6/6 to yellowish orange, 10YR 7/4), mild HCl reaction, 30% fine to coarse	-						+	-
16.3  1.0 SS-6  26.5  1.0 SS-6  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  32-30-25 (55)  330 nonplastic fines, 10-15% fine gravel-sized limestone, carbonate materials  1.0 SS-7  33-28-23 (51)  31.5  35.0  6.3  0.9 SS-8  28-30-50/5 (80/11")  36.4  37.5  38.4  38.4  38.4  38.4  38.5  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand With Limestone (SM) 35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange to grayish orange, (10YR 6/6 to yellowish orange, (10YR 6/6 to yellowish orange, 10YR 7/4), mild HCl reaction, 30% fine to coarse	75 -	25.0					┨	
1.0 SS-6 (55)   moderate HCI reaction, fine to coarse sand-sized, 30% nonplastic fines, 10-15% fine gravel-sized   limestone, carbonate materials   silty Sand (SM)   30.0-31.0' - Same as 25.0-26.0'     Silty Sand With Limestone (SM)   31.5     35.0   35.	16.3	25.0				Silty Sand (SM)	<b>1</b>	<del> </del>
26.5   30,0 nonplastic fines, 10-15% fine gravel-sized   30   30.0   30.0   31.3   31.5   31.	-		1.0	SS-6		moderate HCl reaction, fine to coarse sand-sized.		1
30 30.0 11.3 1.0 SS-7 33-28-23 (51) 31.5 31.5 Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand With Limestone (SM) 35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR R/6) to yellowish orange to grayish orange, (10YR R/6) to yellowish orange to grayish orange, (10YR R/6) to 10YR R/4), mild HCI reaction, 30% fine to coarse		26.5			(55)	$\bigcap$ 30% nonplastic fines, 10-15% fine gravel-sized $\bigcap$	ľ	
31.5  31.5  31.5  31.5  31.5  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 30.0-31.0' except dark yellowish orange, (10YR 6/6 to 10YR 7/4), mild HCI reaction, 30% fine to coarse	_					Aminestorie, carbonate materials	⇃	_
31.5  31.5  31.5  31.5  31.5  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 30.0-31.0' except dark yellowish orange, (10YR 6/6 to 10YR 7/4), mild HCI reaction, 30% fine to coarse	-						┨	-
31.5  31.5  31.5  31.5  31.5  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 30.0-31.0' except dark yellowish orange, (10YR 6/6 to 10YR 7/4), mild HCI reaction, 30% fine to coarse	-						┨	-
31.5  31.5  31.5  31.5  31.5  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 30.0-31.0' except dark yellowish orange, (10YR 6/6 to 10YR 7/4), mild HCI reaction, 30% fine to coarse	-						┨	1
31.5  31.5  31.5  31.5  31.5  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 30.0-31.0' except dark yellowish orange, (10YR 6/6 to 10YR 7/4), mild HCI reaction, 30% fine to coarse	-						┨	-
31.5  31.5  31.5  31.5  31.5  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 25.0-26.0'  Silty Sand (SM) 30.0-31.0' - Same as 30.0-31.0' except dark yellowish orange, (10YR 6/6 to 10YR 7/4), mild HCI reaction, 30% fine to coarse	30	30.0					1	1
31.5   31	11.3	00.0				Silty Sand (SM)	1	
35 35.0 6.3 0.9 SS-8 28-30-50/5 (80/11") Silty Sand With Limestone (SM) 35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), mild HCl reaction, 30% fine to coarse			1.0	SS-7		30.0-31.0 - Same as 25.0-20.0		<u>]</u>
6.3  - 0.9 SS-8    28-30-50/5 (80/11")   Silty Sand With Limestone (SM)   35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), mild HCl reaction, 30% fine to coarse	_	31.5			. ,		┨	_
6.3  - 0.9 SS-8    28-30-50/5 (80/11")   Silty Sand With Limestone (SM)   35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), mild HCl reaction, 30% fine to coarse	-						┨	-
6.3  - 0.9 SS-8    28-30-50/5 (80/11")   Silty Sand With Limestone (SM)   35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), mild HCl reaction, 30% fine to coarse	-						┨	1
6.3  - 0.9 SS-8 28-30-50/5 (80/11")  Silty Sand With Limestone (SM) 35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), mild HCl reaction, 30% fine to coarse	-						┨	-
6.3  - 0.9 SS-8 28-30-50/5 (80/11")  Silty Sand With Limestone (SM) 35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), mild HCl reaction, 30% fine to coarse	-						1	1
6.3  - 0.9 SS-8 28-30-50/5 (80/11")  Silty Sand With Limestone (SM) 35.0-35.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), mild HCl reaction, 30% fine to coarse							1	1
0.9 SS-8 28-30-50/5 (80/11") 35.93.85' - Same as 30.0-31.0' except dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), mild HCl reaction, 30% fine to coarse		35.0					1	_]
yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), mild HCl reaction, 30% fine to coarse	6.3			0.5	28-30-50/5	35.0-35.85' - Same as 30.0-31.0' except dark		<u> </u>
gravel-sized limestone fragments	-		0.9	SS-8		$\vdash$ yellowish orange to grayish orange, (10YR 6/6 to	+	4
	-	36.4				gravel-sized limestone fragments	-	-
	-						+	1
	-						1	1
Driller's Remark: 14:55 remove NWJ rod	-						1	Driller's Remark: 14:55 remove NWJ rod
							]	]
Driller's Remark: Casing set to 40.0'							]	Driller's Remark: Casing set to 40.0'
40	40						$\perp$	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-05	SHEET	3	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723689.4 N, 457584.8 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, NWJ rods, 5-7/8" tri-cone bit ORIENTATION: Vertical

					-	END : 5/0/0007		NED.		ONLINIATION : Vertical
WATER	LEVELS	: 1.2 ft bo	gs on 5/5/		START : 5/4/2007	END: 5/6/2007 SOIL DESCRIPTION	LUGG	EK :	IN.	Jarzyniecki COMMENTS
≩Q€	0445: -	INITEDIC	1 (6)	STANDARD PENETRATION		JOIL DEJORIF HON		$\dashv$	90	CONNINIENTO
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,				SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H B ATIC		RECOVE	ERY (ft)		MOISTURE	DRILLING FLUID LOSS, TESTS, AND				
무유의			#TYPE	6"-6"-6"	CONSISTEN	ICY, SOIL STRUCTURE, MI	NERALOGY		ΜX	INSTRUMENTATION
1.3	40.0			(N)	Sandy Silt Wit	th Limestone (ML)		$\dashv$	III	Driller's Remark: 15:55 insert AWJ rod to
'	40.8	0.8	SS-9	30-50/4 (96")	40.0-40.85' - g	rayish olive mottled with o	live gray,	4		clear out hole (with bit)
-	10.0			. ,	(10Y 4/3 with 5	5Y 3/2), wet, hard, low plas HCl reaction, 35-40% fine	sticity, rapid	A	ш	
-					sand-sized, 20	0-25% of sample is fine to	coarse	/4		4
-					\limestone frag	ments, carbonate material	s	/ ]		_
l _	[				Begin Rock Co	oring at 41.0 ft bgs heet for the rock core log		_]		_
l _					OCC THE HEAT S	ricet for the rock core log				
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-	1							1		1
45	1							1		1
-3.7								ヿ		7
-	1							1		1
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-								4		-
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PROJECT NUMBER:

33884.FL

BORING NUMBER:

GSC-05 SHEET 4 OF 10

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723689.4 N, 457584.8 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 1.2	ft bgs	on 5/	/5/07 START : 5/4/2007 END : 5/	3/200	7 LOGGER : N. Jarzyniecki	
≳ D ⊋	(%			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
BELO CE ANI	RUN, H, AND ERY (%	(%	URES OT	DESCRIPTION	LIC LC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-	41.0		2	41.05' - Bedding plane, 10-25 deg, rough, undulating, open up to 1/2"		Limestone  - 41.0-45.6' - moderate yellowish brown, (10YR 5/4), very fine to fine	5/5/07 08:07 begin coring 08:00 water level = 1.2' below ground surface
-			>5	41.7' - Bedding plane or mechanical break, 25 deg, rough, undulating	H	grained, moderate HCl reaction, voids (up to 1/8") over <5-30% of	below ground surface
-	R1-NQ 5 ft 92%	87	1	42.95-43.1' - Fracture zone, intersecting fractures, fragments to 1" 43.5' - Mechanical break		surface with interclasts at 41.0-41.9' and 44.5-45.6', from 41.0-44.5' trace fossils up to 1/8" and 44.5-45.6' moderately fossiliferous, casts and	
- - 45	3270		2	43.6' - Bedding plane or mechanical break, 15-20 deg, rough, undulating 44.5' - Bedding plane, <10 deg, rough,		molds up to 1" from 43.3-45.6' infill of highly voided and moderately fossiliferous material of the same	
-3.7	46.0		1 NR	undulating, open up to 1/4"  44.8' - Bedding plane or mechanical break, 15-20 deg, rough, undulating	H	color, with infill increasing to more than 70% of surface at 44.5', 41.0-43.1' very weak (R1), 43.1-44.4'	R1:6 minutes
_	13.0		>10	45.25' - Bedding plane or mechanical break, <5 deg, rough, undulating 46.0-46.9' - Fracture zone, multiple		medium strong (R3), 44.4-45.6' weak (R2) <b>No Recovery 45.6-46.0'</b>	
_			2	intersecting fractures, fragments up to 4"  47.4, 47.6' - Bedding plane or mechanical break (2), <5 deg, rough, undulating	Ė	Limestone 46.0-49.05' - moderate yellowish brown, (10YR 5/4), fine grained,	
_	R2-NQ 5 ft 98%	38	>10	48.05' - Bedding plane or mechanical break, <5 deg, rough, undulating, open up to 1/8" 48.5-48.7' - Fracture zone, multiple		moderate HCl reaction, very weak to weak (R1 to R2), poorly competent, friable, organic laminar features	
50 <u> </u>			0	intersecting fractures, fragments up to 4" 48.95' - Bedding plane or mechanical break, <5 deg, rough, undulating, broken on edges		(discontinuous) from 46.0-46.5', some (<5%) dissolution features up to 1/4" poorly fossiliferous, extremely	_
-8. <del>7</del> -	51.0		0	of fractures open up to 1/2" 49.7' - Mechanical break	Ħ	weak (R0) voids up to 1/16" over <5% of surface 49.05-50.9' - moderate HCl reaction,	R2:3 minutes
_			NR) 2	51.15' - Bedding plane, 10 deg, rough, undulating, open up to 1/4"		<ul> <li>very weak to weak (R1 to R2),</li> <li>moderate to highly fossiliferous,</li> <li>casts up to 1"x1/2", voids to 1/16"</li> <li>over 15% of surface</li> </ul>	
-			0 (could be associated with dissolutions), open 1" No Recovery 51.0-54.5' - Sa	No Recovery 50.9-51.0' 51.0-54.5' - Same as 49.0-50.9'			
-	R3-NQ 5 ft 91%	66	0	53.5' - Mechanical break		<ul> <li>except fossils are moderate and up to 1/4", &lt;1/16" voids over 20-30% of surface, infill of medium light gray</li> <li>(N6) and medium gray (N5) up to</li> </ul>	
55			>10	54.5-54.6' - Fracture zone, multiple intersecting fractures, 1" fragments	Ħ	1/8"x1/4", possibly breccia 54.5-55.55' - Same as 46.0-49.05' — except no organics, infill clasts at	
-13. <del>7</del> - -	56.0		1 NR	54.95' - Bedding plane, 25 deg, rough, undulating, open up to 1", associated dissolution and in softer material		51.0-54.5', dissolution feature at 54.95' (1-1/4"x3/4") No Recovery 55.55-56.0'	R3:3 minutes
_			3	55.4' - Bedding plane, <5 deg, rough, undulating 56.3' - Fracture, 50 deg, rough, undulating,	Ħ	Limestone 56.0-58.5' - moderate yellowish brown, (10YR 5/4), fine grained, very	
-			>5	with silt-sized fragments  56.5' - Bedding plane or mechanical break,  <5 deg, rough, undulating, open		mild HCl reaction, extremely weak (R0), voids (1/16") over 5-10% of surface with increasing voids and	
-	R4-NQ 5 ft 78%	30	>5	56.75 - Bedding plane, 10 deg, rough, undulating, open up to 1/8" 57.1-57.3' - Fracture zone, intersecting	Ħ	hardness with depth to 20% of surface, trace cavities <1/4" and weak rock (R2) below 57.3'	
- 60			4	fractures, up to 2" fragments 58.7-59.0' - Fracture zone, intersecting	F	· · ·	
-18. <del>7</del> -	61.0		NR	fractures, up to 2" fragments, associated — laminar organics		-	R4:4 minutes
_	01.0						



PROJECT NUMBER:	BORING NUMBER:			
338884 FI	GSC-05	SHEET	5 OF 1	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723689.4 N, 457584.8 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

COMING	METHODA	ND L	JUII IV	IENT: Dietrich D-50 S/N 232, mud rotary, NQ tools, HVV	Casin		ORIENTATION : Vertical
WATER	LEVELS: 1.2	ft bg	s on 5	/5/07 START : 5/4/2007 END : 5/	6/2007	LOGGER : N. Jarzyniecki	
	,			DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		· · ·	DESCRIPTION	SYMBOLIC LOG		
NE P	₹AŘ	_	₩-	DESCRIPTION	CL	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
E SE	S.F.E	%)	158	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	딩	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
E F S	R S S S	۵	24	PLANARITY, INFILLING MATERIAL AND	ΑB	AND ROCK MASS	SMOOTHNESS, CAVING ROD
SCIE	NE E	R Q D (%)	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				59.15' - Bedding plane, 10 deg, rough,	+	Limestone	
_			>10	undulating, open up to 1/4"		- 58.5-59.9' - moderate yellowish	
			'	59.25' - Bedding plane, 10 deg, rough,		brown, (10YR 5/4), fine grained,	
_				undulating, open up to 1/8", very thin infill of	┰	moderate HCl reaction, very weak to	1
_			3	silt	₽	- weak (R1 to R2), voids (1/16"-1/8")	1
				59.35' - Bedding plane, 10 deg, rough,		over 30-40% of surface, few cavities	
_	R5-NQ			undulating, open up to 1/8"		<1/2" (one 1"x1/2"), black bedding	1
_	5 ft	9	>10			<ul> <li>plane laminations between 58.7-59.9'</li> </ul>	-
	98%			undulating, open up to 1/8"	Н	No Recovery 59.9-61.0'	
				61.3-61.5' - Fracture zone, intersecting	$\vdash$	Limestone	
-			>5	fractures, fragments to <1/16" to 2"	$\pm \Box$	- 61.0-65.9' - moderate olive brown to	-
65				61.9' - Bedding plane, <5 deg, rough,		moderate yellowish brown, (5Y 4/4 to	
-23.7			_	undulating, open up to 1/4"	ш	10YR 5/4), very fine to fine grained,	R5:4 minutes
-			2	62.3' - Fracture, 60 deg, rough, undulating	+	- mild HCl reaction, very weak to weak	-
-	66.0		NR.	62.5' - Bedding plane, <5 deg, rough, undulating, open up to 1/4"	╀╫	(R1 to R2), occasional sections of extremely weak (R0), moderately	-
			0	62.6' - Fracture, 60 deg, rough, undulating,		competent and friable (variably),	
1 7			١٠	opposite direction and possibly associated	$\Box$	voids (1/16") over 5-10% of surface,	1
-				63.1' - Fracture, 60 deg, rough, undulating	ш	sections with intermittent voids	-
_			1	63.15' - Bedding plane, <5 deg, rough,	$\perp$	_ (1/16") over 25-30% of surface	_
			l '	undulating, open up to 1/4"		(secondary infill of 1"-2" cavities),	
_	R6-NQ			63.3' - Bedding plane, <5 deg, rough,	ш	very fine (<1/16" thick) black	1
_	5 ft	57	2	undulating, open up to 1/4"	+	<ul> <li>laminations decrease with depth</li> </ul>	_
	100%			63.9-63.95' - Fracture zone, intersecting		No Recovery 65.9-66.0'	
				fractures, fragments to 1/2"		Limestone	
			4	64.5' - Mechanical break 64.7-64.9' - Fractures, 40-85 deg, rough,	$\perp$	66.0-67.2' - moderate yellowish brown, (10YR 5/4), fine grained,	-
70				undulating, intersecting high angle	₽	moderate HCl reaction, weak (R2),	
-28.7			١,	65.1' - Fracture, 80-85 deg, rough,		voids (1/16"-1/8") over 20-30% of	R6:6 minutes
	71.0		3	undulating, continuation of a fracture in		surface, trace shallow cavities up to	1
-	71.0			64.7-64.9	ш	1/4", trace organic inclusion	1
_			2	65.7' - Bedding plane, rough to smooth,	$\perp$	_ (spheroid and laminar)	_
			-	undulating, bottom has fragments to 30 deg		67.2-67.6' - moderate olive brown,	
				angle, top is <5 deg angle		- (10YR 5/4), mild to moderate HCl	1
-			1	67.25' - Bedding plane, <10 deg, rough to	+	reaction, weak to very weak (R2 to	-
				smooth, undulating, along organic bedding plane	$\perp$	R1), voids (1/16") over 5% of surface, 10% having 2" infill with	
	R7-NQ			68.3' - Bedding plane, <10 deg, smooth,		voids (1/16") over 25-30% of surface,	
-	5 ft	50	0	undulating to planar	┰┦	fine darker laminations increasing	-
-	96%			68.5, 68.6' - Mechanical break (2)	₽₽	- with depth	-
			_	68.9' - Bedding plane, <10 deg, smooth,	$\Box$	67.6-68.3' - Same as 66.0-67.2'	
75			3	undulating, along organic bedding plane		68.3-71.0' - Same as 67.2-67.6'	1
-33.7				69.0' - Bedding plane, <10 deg, smooth, —	ш	— 71.0-75.8' - moderate yellowish	R7:2 minutes
			1	undulating, along organic bedding plane	H	brown, (10YR 5/4), fine grained, mild	
	76.0		NR	69.15, 69.2' - Bedding plane (2), <10 deg,		to moderate HCl reaction, 71.5-72.0'	
]			/INK	3, 11 3 3	Ш	<ul> <li>and 75.0-75.8' extremely weak (R0), weak to medium strong (R2-R3),</li> </ul>	1
-			>5	plane 69.17' - Bedding plane, >85 deg, smooth,	╂┼┦	moderately fossiliferous, casts up to	-
				undulating plane, 200 deg, smooth,	Н	1/4", organic inclusions over <5% up	
				70.0' - Bedding plane, <10 deg, smooth,		to 1/2"x1/8", <1/16" voids over	1
-			3	undulating, along organic bedding plane		30-40% of surface, competent	-
_				70.6, 70.62' - Bedding plane, <10 deg,	+	No Recovery 75.8-76.0'	-
	R8-NQ		١,	smooth, undulating, along organic bedding	$\Box$		
1 7	5 ft 70%	23	3	plane		-	1
-	10/0		1	71.05' - Bedding plane, <5 deg, rough,	μП	-	-
_			>10	undulating, associated with organic fractures, open to 1/4"	H	_	]
80				71.6' - Bedding plane or mechanical break, _	$\vdash$		
-38.7			NR	30 deg, rough, undulating	Ш		R8:4 minutes
-			'"`		╂┼┦	-	-
	81.0				$\vdash$		
					_		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-05	SHEET	6	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723689.4 N, 457584.8 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	LEVELS: 1.2	2 ft bg	s on 5/	5/07 START : 5/4/2007 ENI	D: 5/6/20	D7 LOGGER : N. Jarzyniecki	
≩ D ⊋	(%			DISCONTINUITIES	დ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	, ESS	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI ATIC	IRU MEF	(%) Q	120	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	, ]ặ	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ECC	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNI	FSS I ₩	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ООШ	OIR	α.	шФ	, , , , , , , , , , , , , , , , , , ,			
-			3	72.5' - Bedding plane, top is <5 deg, bottom is 30 deg, piece missing, open to 1"	' ∤;	Limestone - 76.0-76.3' - very pale orange with	_
_				associated with softer zone at bottom		medium light gray mottling, (10YR	_
_			>5	72.85, 73.4, 73.5' - Mechanical break (3) 74.01' - Bedding plane, top is <5 deg, bottor	m -□	8/2 with N5), very fine grained, moderate HCl reaction, medium	_
_				is 30 deg, piece missing, open up to 1/2"	" Ь	strong to strong (R3 to R4), voids	_
_	R9-NQ 5 ft	28	1	associated with softer zone at bottom 74.15' - Fracture, 50 deg, rough, undulating		(1/16") over 5-10% of surface, some cavities up to 2"x1/2" some are	
	90%	20	'	open up to 1/4"	· L	infilled, transitions gradually above	
			_	74.2' - Bedding plane, top is <5 deg, bottom is 30 deg, piece missing, open to 1"	' 1±	and below to 76.3-77.0'	
85			1	associated with softer zone at bottom	11	Limestone 76.3-77.0' - grayish orange, (10YR	
-43.7			1	75.0' - Bedding plane or mechanical break,		7/4), fine grained, mild to moderate	R9:8 minutes
-	86.0		NR	<5 deg, rough, undulating 75.4, 75.5' - Mechanical break (2)	+	HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over	=
-	00.0			76.6' - Bedding plane, <5 deg, rough,	T	20-30% of surface, trace cavities	Water level = 3.0' below
-			1	undulating, open up to 1/4" 76.6-76.9' - Fracture zone, intersecting	廿	<1/4", trace fine (1/16") black inclusions	ground surface -
-				fractures, fragments to 2"	++	77.0-77.7' - Same as 76.0-76.3'	-
-			1	77.2' - Bedding plane, <5 deg, rough, undulating, open up to 1", associated with	$\Box$	77.7-78.8' - Same as 76.3-77.0' 78.8-79.5' - Same as 77.0-77.7'	-
-	R10-NC			dissolution	$\pm$	No Recovery 79.5-81.0'	-
-	5 ft	53		77.5' - Bedding plane, <5 deg, rough,	+	Limestone	-
_	40%			undulating, open up to 1", associated with dissolution	4	81.0-85.1' - moderate brown, (10YR 5/4), very fine grained, strong HCl	-
-			NR	77.65' - Bedding plane, 30 deg, rough,		reaction, medium strong to strong	_
90				undulating, open up to 1", associated with dissolution, lithologic change up to 1/2" open	n -	(R3 to R4), voids up to 1/16" over 20-40% of surface, moderately	
-48.7				77.95' - Bedding plane, <5 deg, rough,	¨ Д	fossiliferous, casts to 1/2", organic	R10:5 minutes
_	91.0			undulating, associated with soft material 78.1' - Bedding plane, <5 deg, rough,		bedding features at 82.0', very pale orange (10YR 8/2) infill up to 4"x2"	
l _			>10	undulating, open up to 1", associated with	F	from 10-40% of surface (infilling	
_			. 10	soft material 78.5' - Bedding plane, <5 deg, rough,	<u></u>	poorly fossiliferous, trace voids to	
			>10	undulating, associated with soft material		85.1-85.25' - dark yellowish brown,	
			/10	78.7' - Bedding plane, <5 deg, rough,	H	(10YR 4/2), strong HCl reaction, clay	
I -	R11-NC			undulating, open up to 1/4", associated with soft material	' T	<ul> <li>lens</li> <li>85.25-85.5' - very pale orange to light</li> </ul>	
-	5 ft 82%	18	>5	79.3' - Bedding plane, <5 deg, rough,	1	gray, (10YR 5/4 to N7), fine grained,	
-				undulating 79.4-79.5' - Fracture zone, intersecting	F	<ul> <li>strong HCl reaction, medium strong to strong (R3 to R4), trace voids to</li> </ul>	
95			0	fractures, fragments up to 1"		1/16"	-
-53.7			<u>&gt;10</u>	81.3' - Bedding plane, <5 deg, rough, undulating, <1/8" open	$\dashv$	— No Recovery 85.5-86.0' Limestone	R11:5 minutes
-	06.0		NR	81.5' - Bedding plane, rough, undulating, top	p 🏳	86.0-88.0' - Same as 85.25-85.5'	-
-	96.0			<5 deg, bottom 30 deg 81.95' - Bedding plane, <5 deg, rough,	廿	<ul> <li>except 86.0-86.9' is highly fossiliferous, casts to 1/2", light olive</li> </ul>	-
-			1	undulating, open up to 1/2"	+	gray (5Y 5/2) silt infill, from	-
-				82.6' - Fracture or fracture zone, 85 deg,	-	86.9-86.95' moderate yellowish	-
-			0	rough, undulating, pieces missing 83.3' - Bedding plane, <5 deg, rough,	+	brown color (10YR 5/4), dissolution cavities to 2" and some infill of	-
-	R12-NG			undulating, open up to 1/2"	+	<ul> <li>moderate yellowish brown (10YR</li> </ul>	-
-	5 ft	95	0	83.5, 83.75, 84.05' - Mechanical break (3) 84.75' - Bedding plane, <5 deg, rough,	$\Box$	5/4) No Recovery 88.0-91.0'	-
-	98%			undulating, mostly not open, missing	占	‡	_
-			>5	fragments on small part of fracture (1/2") 85.2' - Bedding plane, <5 deg, rough,		4	_
100_				undulating, open up to 1"	_#	1_	
-58.7			0	86.92' - Bedding plane, 20 deg, rough, undulating, silt infill described in lithology, no	╮ــــ	1	R12:5 minutes
	101.0			stain, open up to 6"	$\overset{\circ}{\sqsubseteq}$	-	
				· · ·			
1	l	l			1		I



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723689.4 N, 457584.8 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

00111110	METHODA	VD L	VOII IV	/IENT: Dietrich D-50 S/N 232, mud rotary, NQ tools, HW	casiii	<u> </u>	ORIENTATION : Vertical
WATER	LEVELS: 1.2	ft bg	s on 5	/5/07 START : 5/4/2007 END : 5/6	6/2007	7 LOGGER : N. Jarzyniecki	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		<u></u>	DECORIDATION	SYMBOLIC LOG		
N A E	₹ <sub>AN</sub> ,		₩-	DESCRIPTION	C	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
E SE	N F. I	R Q D (%)	158	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	5	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
E F S	R S S S	۵	2 L	PLANARITY, INFILLING MATERIAL AND	₽	AND ROCK MASS	SMOOTHNESS, CAVING ROD
SUE	SEES	R	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SXI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
			NR/	87.75' - Bedding plane, 20 deg, rough,	Н	Limestone	
_			0	undulating, open up to 1-1/2", no infill,		- 91.0-92.9' - very fine grained, trace	_
			•	associated with dissolution features	ш	voids (1/16") over 30% of surface	
				91.4-91.5' - Fracture zone, fragments to	Н	increasing with depth, dusky	1
-			>10		Н	<ul> <li>yellowish brown (10YR 2/2), friable,</li> </ul>	-
_				91.9' - Bedding plane, zone indurated with		5-30% fossils increasing with depth,	_
	R13-NQ			softer organic silt material		92.3-92.8' clay infill very pale orange	
-	5 ft	18	>10		ш	- (10YR 8/2)	-
_	86%			undulating, open up to 1/8" 92.3, 92.5, 92.6' - Bedding plane (3), <5-20	ΗП	92.9-95.1' - yellowish gray, (5Y 7/2),	-
			>10			very weak to medium strong (R1 to R3), highly fossiliferous casts to 1/2",	
105			1-10	infill of dissolution) described in lithology	ш	voids over 20% of surface up to	1
-63.7			2	open up to 1/4"	+	1/16", dissolution features to 3"x1"	R13:2 minutes
				92.8-93.05' - Fracture zone, fragments to	$\vdash \vdash$	No Recovery 95.1-96.0'	1.10.2 minutes
	106.0		NR	1/2"x3/4" intersecting fractures	Ш	Limestone	
]				93.5' - Mechanical break	$\mathbb{H}$	96.0-100.9' - yellowish gray, (5Y 7/2),	1
-			0	93.95' - Bedding plane, <5 deg, rough,	₽	very fine grained, extremely weak to	-
I _				undulating, open up to 1/4"	ш	medium strong (R0 to R3), yellowish	]
				95.0-95.01' - Fracture zone		gray (5Y 8/1) to moderate yellowish	
I -			0	96.1' - Bedding plane, <10 deg, rough, undulating, open <1/4"	ш	brown (10YR 5/4) infill, voids up to 1/16" over 25% of surface, highly	-
_				97.8' - 85-90 deg, rough, undulating, open up	Н	fossiliferous, casts and molds to 1/4",	-
	R14-NQ		0	to 1/8"		shallow dissolution features up to	
	5 ft 99%	95	"	97.95' - Bedding plane, <5 deg, rough,	Ш	2"x1-1/2"	1
-	0070			undulating, up to 1/8" open	Н	No Recovery 100.9-101.0'	-
_			0	98.1-98.2 - Fracture zone, fragments to 1",	$\vdash$	Limestone	-
110			•	intersecting fractures		101.0-101.9' - yellowish gray mottled	
-68.7				99.45' - Bedding plane, <10 deg, rough,	ЪН	with pale yellowish brown, (5Y 7/2	R14:3 minutes
-			0	undulating, open 1/8" 102.0-102.5' - Fracture zone, associated with	+	with 10YR 6/2), very weak to extremely weak (R1 to R0), voids up	-
_	111.0		ND	soft material and organic features,		to 1/16" over 15% of surface,	_
			NR.	intersecting fractures up to 2"		fossiliferous casts and molds to 1/4",	
_			0	102.5-103.25' - Bedding plane or fracture	ш	becomes softer with depth	1
-				zone (10+), rough, undulating, up to 1/4"	$+ \Box$	- 101.9-105.3' - very fine to fine	-
l _			2	open		grained, competent, 5% trace	_
			-	103.4-104.1' - Fracture zone, associated with	ш	organics, fossil molds up to 1/2",	
I -	R15-NQ			soft material and organic features,	Н	- trace fossils, trace voids to 1/16",	1
-	5 ft	78	1	intersecting fractures up to 2", fragments up to 2", highly fossiliferous with fossil molds		very weak (R1) at 105.1' No Recovery 105.3-106.0'	-
	100%			to 2", nignly fossiliferous with fossil moids (trace) same size as fragments -	Ш	- Limestone	]
				104.45' - Bedding plane, <5 deg, rough,	$\vdash\vdash$	106.0-110.95' - Same as	1
			2	undulating, up to 1/4" open	Н	101.0-101.9' except very weak to	-
115_ -73.7			<u> </u>	104.7-105.1' - Fracture zone, some bedding, —	Ш	<ul> <li>weak (R1 to R2), highly fossiliferous,</li> </ul>	D15:5 minutes
-13.1			2	some intersecting, fragments to 2"	$\vdash$	fossil casts and molds, trace to 15%	R15:5 minutes
1 7	116.0		-	105.3' - Bedding plane, <5 deg, rough,	$\vdash$	<1/16" sized infill of very pale orange	1
-	110.0			undulating, up to 1/8" open	ш	- (10YR 8/2) decreasing with depth,	-
-			0	106.65, 108.1, 108.3, 108.5' - Mechanical	$\Box$	trace organic features	] -
				break (4) 112.4, 112.7, 113.0, 114.2, 114.4, 115.8,	$\vdash \vdash$	No Recovery 110.95-111.0' Limestone	
1 7				115.85' - Bedding plane (7), <5 deg, rough,	$\mathbb{H}$	111.0-116.0' - Same as 96.0-100.9'	1
-			2	undulating, <1/8" open		except (5Y 8/1), vellowish grav (5Y	-
_				113.5' - Mechanical break	ш	7/2) is mottled with yellowish gray	]
	R16-NQ		_	117.4' - Bedding plane, <5 deg, rough,	$\vdash\vdash\vdash$	infill, (5Y8/1), very weak (R1), infill	
-	5 ft	62	2	undulating	+	poorly fossiliferous, trace (<5%)	1
-	100%		-	117.5' - Mechanical break	ш	voids up to 1/16", infill is over	-
			0	117.75' - Bedding plane, <5 deg, rough,	Щ	70-100% of surface at 111.0'	
120			١	undulating	$\vdash\vdash$		1
-78.7				118.5' - Bedding plane, <5 deg, rough, undulating	ш		R16:7 minutes
			0	118.8' - Bedding plane, <5 deg, rough,		_	-
	121.0		<u> </u>	undulating, 1/4" open	Ш		
				<u> </u>			
					1		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-05

SHEET 8 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723689.4 N, 457584.8 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

WATER	NATER LEVELS : 1.2 ft bgs on 5/5/		s on 5/	07 START : 5/4/2007 END : 5/6		LOGGER : N. Jarzyniecki				
<b>₹</b> □₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,			
H BI	E RU STH, SVEF	(%) Q	TUF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD			
EPT SURF I.EV	SORE	RQD	'RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	:YME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.			
υѕш	SIR	Ľ.	ΨΔ	119.4' - Mechanical break	S	116.0-121.0' - Same as 111.0-116.0'				
-			0	119.4 - Mechanical break	Ħ	<ul> <li>except from 116.0-118.1' highly</li> </ul>	=			
-					H	fossiliferous and fine grained fossil casts and molds to 1/2", medium	-			
-			1	122.5' - Fracture, 45 deg, rough, undulating	H	<ul> <li>light gray (N6) infill over &lt;10%, voids</li> </ul>	-			
-	R17-NQ				Ш	up to 1/16" over 20% of surface and 118.1-121.0' fine grained to very fine	-			
-	5 ft	20	1	123.15' - Bedding plane, <5 deg, rough, undulating, up to 1/4" open	ш	<ul> <li>grained, size decreasing with depth</li> </ul>	-			
-	100%			and data ng, ap to 1/1 open	ш	Limestone 121.0-126.0' - Same as 111.0-116.0'	-			
-			>10		Н	<ul><li>except 124.4-124.75' is mottled with</li></ul>	-			
125 -83.7				124.8-124.95' - Fracture zone, intersecting —	H	pale orange (10YR 8/2)	R17:2 minutes			
-			3	fractures, 1-1/2" fragments	H	_	-			
-	126.0			125.8-126.0' - Fracture zone, intersecting	H	126.0-131.0' - yellowish gray, (5Y	-			
-			1	fractures, 1-1/2" fragments	Н	- 7/2), very fine to fine grained, very	-			
-				126.75' - 80 deg, rough, undulating, open	ш	weak to weak (R1 to R2), grain size increasing with depth, <10-25% voids	-			
-			0	1/8" to tight (missing very small fragments in part of fracture)	口	<ul> <li>to 1/16", voids increasing with depth,</li> </ul>	-			
-	R18-NQ			128.0' - Bedding plane, <5 deg, rough,	Ш	moderately fossiliferous, fossils to 1/4", fossil size increasing with depth,	-			
-	5 ft	85	1	undulating, up to 1/4" open	+	trace dissolution zones to 1/2",	-			
-	100%			100 1 100 01 15 11	Ħ	129.1-129.8' very fine to fine grained	-			
-			>10	129.1-129.8' - Bedding plane or mechanical break, <5 deg, rough to smooth, planar to	世	_	-			
130 <u> </u>				undulating, tight, some have <1/8" open —	Н		R18:5 minutes			
-			1	130.3' - Bedding plane, <5-30 deg, rough to	Н	_	-			
-	131.0			smooth, planar to undulating, (break changes in middle of fracture, smoothness and planar	ш	131.0-136.0' - Same as 126.0-131.0'	-			
-			0	change with angle), <1/8" open	ш	<ul> <li>except from 132.2-132.7' fine and</li> </ul>	-			
-				131.8' - Mechanical break	ш	very fine grained, trace organic content, moderate to highly	-			
-			1		Н	<ul> <li>fossiliferous (casts and molds).</li> </ul>	-			
-	R19-NQ			132.7' - Bedding plane, <10 deg, smooth to rough, undulating, up to 1/8" open	H	133.35' 1/4" bedding plane of very light gray (N8)	-			
-	5 ft	85	0	133.2, 133.5, 133.6' - Mechanical break (3)	H	-	-			
-	100%			134.05' - Bedding plane, 15-20 deg, rough,	世	-	-			
-			1	undulating, could be mechanical break due to	H	-	-			
135_ -93.7				drilling	囯	<del>-</del>	R19:8 minutes			
-	400.0		1		口	-	=			
-	136.0			135.8' - Bedding plane, <5 deg, smooth, undulating, rock fragments	団	136.0-137.7' - Same as 131.0-136.0'	-			
-			0	undulating, rock fragments 136.2, 136.3, 137.4' - Mechanical break (3)	H	<ul> <li>except grades from moderate</li> </ul>	-			
-					Ħ	yellowish brown to yellowish gray (10YR 5/4 to 5Y 7/2), fine to very fine				
-			2		Ħ	grained, extremely weak to weak (R0				
-	R20-NQ			137.7' - Bedding plane, <5 deg, rough, undulating, 1/2" open	H	to R1), very fine at 137.4', 1.2" thick moderate olive brown (5Y 4/4), trace				
-	5 ft	44	>5	137.95-138.3' - Bedding plane, <5 deg,	╀┤	<ul><li>voids to 1/16"</li></ul>				
-	98%			smooth to rough, planar, <1/8" open except for 138.3' with up to 1/4" open	囯	-				
			1	138.5' - Mechanical break, along bedding	囯	-				
140 -98.7				plane 138.6' - Bedding plane, <5 deg, rough,	団	<del>-</del>	R20:10 minutes —			
-	141.0		0	undulating, 1/4" open	$\Box$	-	-			
-	141.0				П					
					1		1			



WATER LEVELS: 1.2 ft bgs on 5/5/07

PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-05

SHEET 9 OF 10

### **ROCK CORE LOG**

LOGGER : N. Jarzyniecki

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723689.4 N, 457584.8 E (NAD83)

START : 5/4/2007

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

END: 5/6/2007

CORING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

<u> </u>	LLVLLS . 1.2	- it by	3 011 0		7200	101	LOGGER . N. Jaizyniecki	T
≥∩ ∵	. (9			DISCONTINUITIES	ق	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	LOG		ROCK TYPE, COLOR,	
표원인	L'A ER'A	(%	FRACTURES PER FOOT		SYMBOLIC	1	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
∓XX	R F S	(%) <sub>Q</sub>	달	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BO		WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
P R R	유했다	Ø	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ĮΣ		AND ROCK MASS	DROPS, TEST RESULTS, ETC.
回る回	Ola	œ		THORESO, SORE ACE STAINING, AND HIGHTINESS	Ś	`	CHARACTERISTICS	·
			NR/	139.3' - Bedding plane, <5 deg, rough,			Limestone	
-			>10	undulating, open	╁	+	137.7-138.3' - moderate olive brown,	1
I -			<b>-</b>	140.15' - Fracture, 45 deg, rough, undulating,	ᡛ	ⅎ	(5Y 4/4), very fine grained, medium	-
l _			5	open 141.0-141.25' - Fracture zone, intersecting -		ą.	strong (R3), voids (up to 1/16") over 20% of surface, moderate fossils	
			ا	fractures, fragments 1", organic stain	$\vdash$	-	(casts) to 1/4"; interbedded with	
-	R21-NC			141.6, 141.8' - Bedding plane (2), 10-20 deg,	++	+	medium light gray (N6) with trace	1 1
l -	5 ft	30	>10	rough, undulating, organic stain, up to 1/4"	-	_	voids to 1/16", poorly fossiliferous	-
	82%			open associated dissolution features	┸	-L	138.3-140.9' - Same as 131.0-136.0'	
			>10	141.7' - Fracture, 85 deg, rough, undulating,	Н	-	except grades from poorly	
l			/10	organic stain, open to 1/8"	tr	+	fossiliferous to moderate to high	<del> </del>
145			0	142.1' - Bedding plane, <5 deg, rough,		_	fossils, fossils up to 1/4" grades from	
-103.7				undulating, organic stain 142.4, 142.5, 142.6' - Bedding plane (3), <5	$\vdash$	-	trace voids (<1/16") to voids (1/16") over 10% of surface, interbeds of	R21:11 minutes
_	146.0		NR	deg, rough, undulating, up to 1/8" open	┱	╅	light olive gray (5Y 5/2) up to 1/2"	1
-	146.0			142.9' - Bedding plane, <5 deg, rough,	亡	1	thick, interbed (discontinuous or	-
-			1	undulating, up to 1/2" open	$\perp$	+	could be infill) at 138.75' very light	] _
1				143.1-143.4' - Fracture zone, intersecting	$\vdash$	-	gray (N8) and infill of same material	
I -				fractures, fragments to 1-1/2", organic stain	Ľ	ⅎ	seen in interbeds of light olive gray	1
-			1	144.0-144.2' - Fracture zone, intersecting	╨		(5Y 5/2) at 140.15' that is 2" thick	1 -
_				fractures, pieces to 1-1/2", organic stain 144.4' - Bedding plane, <5 deg, rough,	ᅪ	┸	No Recovery 140.9-141.0'	<u> </u>
	R22-NC			undulating, up to 1/2"			Limestone 141.0-144.2' - light gray to light olive	
-	5 ft 96%	62	1	144.7' - Bedding plane, <5 deg, rough,			gray, (N7 to 5Y 6/1), very fine	1
-	90%			undulating, organic stain	╁	+	grained, weak to medium strong (R2	-
l _			4	144.9' - Bedding plane, 5 deg, rough,	╨	╁	to R3), voids (up to 1/16") over	
150				undulating, up to 1/4" open			10-15% of surface, fossils up to 1/4",	
-108.7				146.35' - Bedding plane, <5 deg, smooth to	1_		dissolution features up to 2"x1/2",	R22:11 minutes
-			>10	rough, undulating, up to 1-1/2" open	₩	+	dusky yellow (5Y 6/2) infill very fine	I
l _	151.0		NR	147.1' - Fracture, 60 deg, rough, undulating 148.5' - Bedding plane, 10 deg, rough,	ᅪ	┸	grained, voids over 25%, few 1/4"-1/2" dissolution features	
			igcup	undulating, up to 1/2" open			144.2-145.1' - moderate yellowish	
-			>10	149.3, 149.45' - Fractures (2), 75-80 deg,	╨	╬	brown with wavy light olive gray	1
-				rough, undulating	╂Т	╁	beds, (10YR 5/4 with 5Y 5/2), up to	-
_			>5	149.65' - Bedding plane, 20 deg, rough,			1/2" thick and a 1-1/2" thick medium	<u> </u>
			'	undulating, open <1/8"	$\vdash$	_	light gray (N6) bed, dusky yellow and	
_	R23-NC			149.9' - Bedding plane, <5 deg, rough,	т	+	light olive gray has 20-30% voids up	1
-	5 ft	56	1	undulating 150.25-150.4' - Fracture zone, intersecting	t	₽	to 1/16", fossils to 1/8" No Recovery 145.1-146.0'	-
I -	90%			fractures, 1" fragment	╨	4	Limestone	]
1				150.6-150.8' - Fracture zone, intersecting	$\vdash$	-	146.0-150.8' - moderate yellowish	
155			2	fractures, 1" fragment	Ľ		brown to yellowish gray, (10YR 5/4 to	1
155 <u> </u>			<u> </u>	151.15-151.3' - Fracture zone, intersecting —	$\perp$	+	5Y 7/2), fine to very fine grained,	R23:8 minutes
			2	fractures up to 1"	╁┼	╁	grain size increasing with depth,	1 120.0 minutes
1	156.0		NR	151.4, 151.6' - Bedding plane, <5 deg, rough,	Ľ		appears to have breccia clasts,	
I -				undulating, open up to 1/2" 151.8' - Bedding plane, <5 deg, rough,	T		yellowish gray (5Y 7/2), pale olive (10YR 6/2) and light gray (N7),	11:10 water level 3.0'
-				undulating, up to 1/8" open	1	$\vdash$	moderately fossiliferous up to 1/4", at	-
_				151.9-152.2' - Fracture zone, fragments to 2"	1	L	148.9' abrupt change to light olive	I
1				152.5' - Fracture, 65-70 deg, smooth,	1		gray (5Y 6/1), very fine grained,	11:11 grout hole, used 31
1 -				undulating, organic stain	1		strong to very strong (R4 to R5),	bags of grout
-				152.6' - Bedding plane, <5 deg, rough,	1	$\vdash$	trace voids to 20%, voids increase	-
I -				undulating, organic stain, <1/8" open	1	L	with depth, poorly fossiliferous with	]
1				152.8' - Bedding plane, <5 deg, rough, undulating, associated with dissolution zone	1		bedding features at 150.05-150.35' yellowish gray (5Y 8/1), olive gray	
1 -				153.3' - Fracture, 65-70 deg, smooth,	1	-	(5Y 3/2) and pale yellowish brown	1
I -				undulating	1	-	(10YR 6/2)	-
I _				154.4' - Fracture, 65-70 deg, smooth,	1		No Recovery 150.8-151.0'	
				undulating	1		Limestone	
I -				154.8' - Fracture, 65-70 deg, smooth,	1		151.0-152.8' - Same as 137.7-138.3'	1
				lundulating	╂	+		-
					1			
			1					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-05	SHEET	10	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723689.4 N, 457584.8 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Crews

				iEIVI . Dietrich D-30 3/14 232, mad rotary,		,,,,,,		ORIENTATION: Vertical
WATER	LEVELS: 1.2	ft bgs	on 5/	/5/07 START : 5/4/2007	END : 5/6	/200	7 LOGGER : N. Jarzyniecki	
	_			DISCONTINUITIES		رم	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		(C	DESCRIPTION		SYMBOLIC LOG		<del>                                     </del>
NE E	₹ĄŽ		꼾ㄴ	DESCRIPTION		CL	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A A C E	S F E	(%) Q	28	DEPTH, TYPE, ORIENTATION, ROU	IGHNESS	딩	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
₽₽₩	A S C C C C C C C C C C C C C C C C C C	αD	AC.	PLANARITY, INFILLING MATERIA	AL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD
SUB	SE E	RG	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND	O TIGHTNESS	SΥ	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
		_				H	Limestone	<del>                                     </del>
					_		- 152.8-154.4' - yellowish gray mottled	_
							with pale olive, (5Y 7/2 with 10Y 6/2),	
1 7					_		very fine grained, organic laminations	1
I -					-		<ul> <li>at 153.55', dissolution features to</li> </ul>	-
							1/2"x1/4", moderately fossiliferous,	
1 7							fossils to 1/4", voids (1/16") over	1
-					-		- <10% of surface	-
I -					_		154.4-155.5' - Same as 137.7-138.3'	
							except weak to strong (R2 to R4),	
I -					-		<ul> <li>beds up to 5" thick</li> <li>No Recovery 155.5-156.0'</li> </ul>	1
-							Bottom of Boring at 156.0 ft bgs on	-
					_		- 5/6/2007	]
							5/5/2001	1
-					-		_	1
-					-		_	-
1 7					_			1
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-06	SHEET	1	OF	11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

						y, catheau, NVV 100S, 3-7/6			ORIENTATION: VEItical
WATER	LEVELS	. ∠.5 π bo	gs on 4/17		START : 4/17/2007	END: 4/19/2007 SOIL DESCRIPTION	LUGGEF	₹ : U.	Wallestad COMMENTS
<u></u> ≥9€	CAMPIE	INTERVA	I /#\	STANDARD PENETRATION		GOIL DEGORIF HON		90.	OUMINICIALO
ELC ON (	SAMPLE		- '	TEST RESULTS	SOIL NAME.	, USCS GROUP SYMBOL,	COLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H B		RECOVE			MOISTURE (	CONTENT, RELATIVE DEN	NSITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENC	Y, SOIL STRUCTURE, MIN	NERALOGY	SYN	INSTRUMENTATION
42.5	0.0			,	Poorly Graded				
-	1	1.1	SS-1	1-2-2	0.0-0.8' - very lig	ght gray to brownish gray, ray mottling, moist, soft, v	(N8 to 5YR -		-
-	1.5			(4)		HCI reaction, silica sand,	dark /	$\stackrel{\sim}{\sim}$	-
-	1.5				mottling (organic	cs) and 5% organics as re	oots and	1	-
-	1				Sandy Organic	Soil (OL)		ı	-
-	1				0.8-1.1' - brownis	sh black, (5YR 2/1), mois	st, no HCl	ł	Encountered water between 0.8' and 5.0',
-	-					c matter and/or nonplastic organics as roots	c siit, 20%	ł	water level at 2.5' below ground surface at
-						g		ł	14:15
-							-	1	<del>-</del>
	·						-	ł	-
5 37.5	5.0				Silty Sand (SM)	1		1114	
-		1.2	SS-2	1-3-4	5.0-6.2' - modera	ate yellowish brown, yello			-
-		1.2	33-2	(7)	(10YR 5/4, 5Y 8/ nonplastic, mode	<ol> <li>wet, loose, fine graine erate yellowish brown tra</li> </ol>	ed, nsitionina to 💆	Ш	-
-	6.5				vellowish gray, fi	ine silica sand with 20-30	% fines / -	ı	-
-	-						-	ł	-
-	-						-	ł	-
-	_						-	ł	-
-	-						-	-	-
-	-						-		-
-							-	ł	-
10 <u> </u>	10.0				→ Silty Sand (SM)			717	
32.5	-		000	2-4-14	\ 10.0-10.2' - yello	owish brown, (5Y 7/2), we			-
_	-	8.0	SS-3	(18)	dense, fine grain with 20% plastic	ned, no HCl reaction, fine	silica sand	<b>1</b>	-
-	11.5				Clayey Sand (So	C)		ł	Driller's Remark:11.5-15.0' heavy chattering
_	-				10.2-10.75' - yell	lowish gray, (5Y 8/1), we	t, medium	ł	Driller's Remark. 11.5-15.0 fleavy chattering
-					plasticity, moder	parse grained, low to med rate HCl reaction, 30% lo	w to medium   -	-	-
-	-				plastic fines, one	e coarse gravel-sized lime	estone _	ł	-
-					ıragment, organi	ic lens from 10.55-10.6'		1	-
-							-		-
-							-		-
15	15:9	0.4	00.4	50/1.5	C:14 (BALL)				
27.5		0.1	SS-4 /	(50/1.5")	Silt (ML) 15.0-15.1' - gray	rish yellow, (5Y 8/4), mois	st, nonplastic, /-	1	Driller's Remark:15.2-16.0' heavy chattering _
-					∖ rapid dilatancy, r	moderate HCl reaction, (	5-10%) very	1	-
1 -					sand-sized to fin	limestone fragments with ne gravel-sized, carbonate	e materials / -		-
1 -						· ·			-
-							-	1	-
-							-		_
1 -							-		-
1 -							-		_
1 -							_		_
20								$\vdash$	
1									



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.5 ft bo	s on 4/17	7/07	START: 4/17/2007 END	: 4/19/2007	LOGGER	: C.	Wallestad
				STANDARD	SOIL DES	SCRIPTION		SYMBOLIC LOG	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	RECOVE		PENETRATION TEST RESULTS 6"-6"-6" (N)	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY				DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
22.5 - - - -	20.0	0.2	SS-5	50/2 (50/2")	Limestone Fragments 20.0-20.2' - grayish yellow, reaction, fragments to 3/16	(5Y 8/4), strong HCl " in size	- - - - -		- - - - -
25	25.0	1.1	SS-6	28-30-45 (75)	Silty Sand (SM) 25.0-26.1' - grayish orange dense, mild to moderate H sand-sized and trace grave fines	CI reaction, fine to co	oarse		- - - - - - -
30	30.0	0.9	SS-7	20-13-8 (21)	Silty Sand (SM) 30.0-30.85' - Same as 25.0 strong HCl reaction, grayis 7/4), from 30.7-30.85' and	h vellow limestone (1	ate to -		- - - - -
- - - 35_ 7.5 - - -	35.0	0.2	<u>SS-8</u>	50/2.5 (50/2.5")	Silty Sand (SM) 35.0-35.15' - Same as 25.0	D-26.1'	- - - - - - - -	15 10 15	- - - - - - - - -
- - - 40							- - - -		



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### **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 2.5 ft bo	s on 4/17	7/07	START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad
				STANDARD	SOIL DESCRIPTION O COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
1 BE 1 CE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
PTF PRFA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
3 E	40.0	0.1	SS 0	(N)	l l
2.5	40.0		\_SS-9_/	50/1 (50/1")	Limestone Fragments  \[ \begin{align*} \text{Driller's Remark: Heavy chatter throughout} \\ \dots \text{40.0-40.1'} - \text{pale yellowish brown, (10YR 6/2),} \\ \dots Vision of the content of th
_					\moderate HCl reaction, carbonate \
_					<b>.</b>
					<u> </u>
_					<u> </u>
_					<u> </u>
_					<u> </u>
_					<u> </u>
_					<u> </u>
45	45.0 45.2		00.40		Silty Sand And Limestone (SM)
-2.5	70.Z	0.2	SS-10	50/2 (50/2")	Silty Sand And Limestone (SM) 45.0-45.2' - light olive gray, (5Y 5/2), wet, very dense,
				(00.2)	\ fine to coarse grained, moderate HCl reaction, fine to \ \
_					\coarse sand-sized, 20-25% fines, 40% of sample is \coarse sand to fine gravel-sized limestone fragments \centcolor{-}
_					
_					<u> </u>
_					<b>.</b>
					<u> </u>
_					<u> </u>
_					<u> </u>
50	50.0				
-7.5				45-25-40	Silty Sand And Limestone (SM) 50.0-51.25' - moderate yellowish brown, (10YR 5/4),
_		1.3	SS-11	(65)	wet, very dense, fine grained, moderate HCl reaction,
_	51.5				20-25% low plastic fines, 35-40% of sample is coarse
-					
-					
					] .
					] .
					] .
-					
55	55.0				Limestone And Silty Sand (SM)  Driller's Remark: During SPT for SS-12
-12.5					\ 55.0-55.2' - Same as 50.0-51.25' except 60% of \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-		0.2	SS-12	7/1-1/24	\sample is limestone, 40% of sample is silty sand possible 2' void at 55.1'
-				(8/25")	
-	57.1				
-					
-					
-					
-					- <del> </del>
					-
60					<del>                                     </del>



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, NW rods, 3-7/8" tri-cone bit

WATER	LEVELS	: 2.5 ft bo	gs on 4/17	7/07 S	START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad
					SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H H H		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
EVA EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
-17.5	60.0			(N)	Silty Sand And Limestone (SM)
-	00.0	1.2	SS-13	42-32-50/4.5	60.0-61.2' - Same as 50.0-51.25' except 45-50% fine
-	61.4	1.2	00-10	(82/10.5)	to coarse limestone fragments, 30% fine to coarse sand-sized, 20-25% low plastic fines
-	01.4				Begin Rock Coring at 61.5 ft bgs
-					See the next sheet for the rock core log
-					
-					
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-					<b>- 1 1</b>
65					
-22.5					
-					1 1
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-27.5					
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					1
80					



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

	-			TENT . Diethan D-30 3/N 232, mad rotary, NQ tools, HW	,		ORIENTATION : Vertical
WATER	LEVELS: 2.5	ft bgs	s on 4	/17/07 START : 4/17/2007 END : 4/	19/200	7 LOGGER : C. Wallestad	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		m	DESCRIPTION	SYMBOLIC LOG	DOOK TYPE OOLOD	
N N N N N N N N N N N N N N N N N N N	N. S. S.	<u></u>	FRACTURES PER FOOT	DECOMI HON	힏	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
A H S H	E E E	(%) Q		DEPTH, TYPE, ORIENTATION, ROUGHNESS,	ğ	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
L H 뉴 스	N N N N N N N N N N N N N N N N N N N	Ø	A H	PLANARITY, INFILLING MATERIAL AND	Į ₹	AND ROCK MASS	DROPS, TEST RESULTS, ETC.
日の日	SER	ď	# #	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	
	61.5			61.7' - Mechanical break	Ш	Limestone	Resume drilling at 07:45 at
-			2	62.0, 62.1, 62.65, 62.85, 63.15, 63.3, 63.75,	+	- 61.5-65.8' - moderate yellowish	4/18/07 with rock coring –
-				64.15, 65.4, 65.55' - Bedding plane or		brown, (10YR 5/4), fine grained, moderate HCl reaction, extremely	Water level is 2.5' below _ ground surface
l _			4	mechanical break (10), horizontal, smooth,	Щ	- weak to weak (R0 to R2), rock	ground surface
				undulating, tight to 1/8" open	Н	strength increasing with depth, voids,	
-	R1-NQ			62.35' - Mechanical break		to 3/16" over 20-30% of surface,	1
-	5 ft	32	2		₩	- moderately fossiliferous with casts to	1
-	86%				+	1/4"-1/2", dissolution cavities to 1/2"x1" over 5-15% of surface, (dark	-
65			1	_		— possibly organic) material over	
-22.5			'		Н	5-10% as of surface from 61.5-62.3'	
-			1		$\Box$	-	R1:2 minutes
-			NR		$\Box$	- No Recovery 65.8-66.5'	-
l _	66.5		INIX		₽₩	_	
			40	66.5-66.8' - Fracture zone		Limestone	
I -			10	67.1, 68.4, 68.9, 69.6, 70.5' - Bedding plane	Ш	- 66.5-71.05' - Same as 61.5-65.8' except very weak to weak (R1 to R2),	Driller's Remark: Driller
-				or mechanical break (5), smooth, undulating,	╁┼	no dark/organic material, and all very	runs in 2nd gear at 350 psi -
l -			1	tight to 1/8" open	ш	- weak to weak rock (R1 to R2)	-
_					Щ	<u>,</u>	
	R2-NQ				Н		
-	5 ft 91%	52	3	69.1, 69.2, 69.85, 69.95, 70.4' - Bedding	ш	-	1
-	91/0			plane or mechanical break (5), rough,	╁┼┼	-	-
70			6	undulating, tight to 1/2" open	+		
-27.5				70.15, 72.5, 72.75, 73.0, 75.05, 75.55' -			
			1	Bedding plane or mechanical break (6),	Н	_	R2:3 minutes
-	74.5		NR	horizontal, smooth, undulating, tight 70.35' - Fracture or mechanical break, rough,		No Recovery 71.05-71.5'	1
-	71.5		INIX	undulating	╂┴╂	Limestone	-
l -			1	andalaling	H	- 71.5-76.4' - Same as 61.5-65.8'	_
						except no dark, possibly organic	
					Ш	material, dissolution cavities to	Ī
-			4		+	- 1"x1/2" over 5% surface, extremely	1
-	DO NO			73.25, 73.6, 73.75' - Bedding plane or	+	weak rock (R0) from 72.2-72.6' and 72.9-73.4' and increasing to	-
_	R3-NQ 5 ft	66	2	mechanical break (3), <10 deg, rough,	ᅪᅥ	- moderately strong rock (R3) with	_
	98%	00	-	undulating, tight, 1/2" open 74.0' - Mechanical break		depth	
75				74.0 - McGhaillear Break	Ш	<del>-</del> ·	1
-32.5			1	_	+		_
					ш	-	R3:9 minutes
l _			1		H	_	R3.9 minutes
	76.5						
_			NR.	76.6, 77.35, 77.55, 77.8, 78.4, 78.9, 79.9' -	Ш	No Recovery 76.4-76.5'	1
-			2	Bedding plane (7), horizontal, smooth,	╂┼╂	Limestone	-
_			<u> </u>	undulating, tight to 1/8" open		76.5-77.35' - moderately yellowish brown to grayish orange, (10YR 5/4	-
			10	77.8-78.15' - Fracture zone, fragments to	Ш	to 10YR 7/4), medium grained,	
			10	1"x2"	Н	moderate HCl reaction, very weak to	Driller's Remark: 50% loss
-	R4-NQ			78.25' - Fracture, 80 deg, smooth, undulating,	口	medium strong (R1 to R3), voids to	of circulation at 78'
-	5 ft	25	3	open	$+\!$	1/8" over 15-30% of rock, poorly	-
I -	64%		L.	79.0' - Bedding plane or mechanical break,	╁┼┦	fossiliferous with trace casts to 1/16"  x3/16", trace dissolution cavities to	]
80			1	<10 deg, rough, undulating, 1/2"-1" open 79.5' - Fracture, 80 deg, smooth, undulating, _		2"x1"	
-37.5				tight	14		
I -			NR	-9	╆	-	R4:7 minute
-					口	_	-
	81.5				Ш		



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

CORING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				ILIVI : Dietricii D-50 5/N 252, maa rotary, NQ tools, mv			ONENTATION: Vertical
WATER	LEVELS : 2.5	ft bg	s on 4	/17/07 START : 4/17/2007 END : 4/	19/200	7 LOGGER : C. Wallestad	
200	(9)			DISCONTINUITIES	၂ ၂	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ΞS	DESCRIPTION	) LOG	ROCK TYPE, COLOR,	OLZE AND DEDTIL OF GARING
ᆱᇬ은	RUY H. A	(%) Q	URI	DEDTH TYPE OPIENTATION POLICHNESS	SYMBOLIC	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
PTA A	RE CO CO	Q D (	ACT R F(	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	MBC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SU	Sää	R	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SY	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
				81.55,82.55,83.3,84.0' - Bedding plane or	Ш	Limestone	
_			3	mechanical break (4), horizontal, rough,	$\dagger \exists \dagger$	<ul> <li>77.35-79.1' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR</li> </ul>	Driller's Remark: Void at
-				undulating, 1/4" open to open 81.95, 82.4, 83.15' - Bedding plane or		6/2), fine to medium grained, strong	81.5-82.0 (dropped stem), -
-			10	mechanical break (3), 10-20 deg, rough,	╂┼┨	<ul> <li>HCl reaction, weak to medium strong</li> </ul>	100% loss of circulation _
_	DE NO			undulating, tight to 1/2" open	Ш	(R2 to R3), voids to 1/8" over 5-20% of surface, poorly fossiliferous with	-
_	R5-NQ 5 ft	28	4	82.4-83.8, 83.3-83.8' - Fracture zone (2), fragments to 1"x3"	Н	trace fossil casts to 1/8"x1/8",	_
	76%		·	84.1' - rough, 2 intersecting near vertical		dissolution cavities to 1"x1/2" (trace)	_
85			10	fractures, undulating		79.1-79.7' - Same as 76.5-77.35'  — <b>No Recovery 79.7-81.5'</b>	
-42.5				84.7-85.3' - Fracture zone, fragments to — 1-1/2"x3", fractures at 70-90 deg	Ш	Limestone	
_				xo ,aota.oo at , o oo aog	ш	81.5-85.3' - Same as 79.1-79.7'	R5:5 minutes
-	00.5		NR	-	╂┼┦	No Recovery 85.3-86.5'	1
-	86.5		10 /			Limestone	-
-					╂┼╂	- 86.5-86.65' - Same as 79.1-79.7'	-
-					Ш	No Recovery 86.65-91.5'	] -
					$\vdash \vdash \vdash$	-	]
				_	П	_	_
	R6-NQ 5 ft	0					
	3%	0	NR		Ш		1
90				-	Ш	-	Driller's Remark: Core
-47.5				_	H	<del></del>	blockage caused no — recovery for core run R6
_						-	R6:25 minutes
-					╁┼╂	-	-
-	91.5				ш	Limestone	1
_			10	91.65, 92.9, 94.05, 94.5' - Bedding plane (4), horizontal, smooth, undulating to planar, tight	団	- 91.5-94.1' - yellowish gray, (5Y 7/2),	-
_				to 1/2" open	H	very fine to fine grained, strong HCl reaction, medium strong (R3), voids	-
_			10	91.65-92.0' - Fracture zone, fragments to	H	- to 1/16" over 5-10% of surface, trace	_
_		44		1-1/2"x2", some silt infill 92.5-92.8' - Fracture zone, fragments to	Н	fossil casts to 3/16", trace cavities to	_
	R7-NQ 5 ft		10	1-1/2"x1-1/2", silt and coarse sand infill,	Ш	1-1/2"x1/16", with poorly competent infill, silty layer at 91.9-92.0' and	
	94%		'0	92.5-92.65' 93.25, 93.3, 93.55' - Fracture zone or	Ш	92.5-92.65'	]
95				mechanical break (3), 70 deg, undulating to	H	94.1-96.2' - very pale orange to	]
-52.5			1	stepped, smooth to rough		<ul> <li>grayish orange, (10YR 8/2 to 10YR 7/4), fine to medium grained, strong</li> </ul>	
-			0	93.5' - Fracture, 80 deg, smooth, undulating, dark staining, tight	ᡛ᠊ᡰᡰ	HCl reaction, very weak to weak (R1	R7:21 minutes
-	06.5		_	93.75' - Fracture, as above at 93.5' except 20	Ш	to R2), voids to 1/16" over 25% of surface, trace fossil casts to	-
-	96.5		NR	deg 94.1-94.25' - Fracture zone	Ш	1/4"x1/8", no visible cavities, silt layer	-
-			2	95.7' - Fracture, 40 deg, smooth, planar, silty	$\{-\}$	(low plasticity) from 94.1-94.5'	-
-				infill, tight	口	No Recovery 96.2-96.5' Limestone	-
-			0	96.55, 96.6' - Bedding plane (2), 0-10 deg, smooth, undulating to stepped, dark staining	╀╫	96.5-101.5' - Same as 94.1-96.2'	] -
				(possibly organics), infill, tight	Щ	except trace cavities with light colored infill to 1"x1-1/2"	]
	R8-NQ 5 ft	97	1		Ш	- COLOTEC IIIIII TO 1 X1-1/2	]
	100%	31	L'		$\square$	_	]
100				99.4' - Mechanical break or fracture, 30 deg, rough, undulating, tight to 1/4" open	口		]
-57.5			1	100.1' - Fracture, at 99.4' except very rough	₽₽		7
-				and undulating	口	-	R8:7 minutes
-	101 5		0	-	╁┼	-	1
	101.5				曰		1
			1				•



PROJECT NUMBER:

33884.FL BORING NUMBER:

GSC-06 SHEET 7 OF 11

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 2.5	ft bgs	s on 4	/17/07 START : 4/17/2007 END : 4/	19/20	D7 LOGGER : C. Wallestad	
≥0 ::	6)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	Ä, AND ≪ (%		ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SURI	COR	ROI	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	-			101 71 Freeture 90 des excette undulation	ш	Limestone	
-			1	101.7' - Fracture, 80 deg, smooth, undulating, tight	$\blacksquare$	<ul> <li>101.5-106.0' - Same as 94.1-96.2' except trace cavities to 1/2" diameter</li> </ul>	-
-			40	100 0 100 0E 100 0 100 EE 100 0 101 0E		with no infill and trace fossil casts to	
-			10	102.8, 103.25, 103.3, 103.55, 103.9, 104.85, 105.65, 105.75' - Fracture (8), 0-20 deg,	$\vdash$	- 3/4"x1/4"	
	R9-NQ 5 ft	69	3	smooth, undulating to planar, tight to 1/4" open			
_	90%	00		103.25-103.3' - Fracture zone, fragments to	F	_	_
105 -62.5			1	1/2"x1"	片	_	
-02.5					片	_	R9:7 minutes
-			2		岸	No Recovery 106.0-106.5'	K9.7 Hilliutes
-	106.5		NR		廿	Limestone	-
-			1	107.1, 108.4, 108.7, 109.25, 109.65, 109.8,		- 106.6-111.5' - Same as 101.5-106.0' except percentage of voids	-
-				110.3' - Bedding plane or mechanical break	世	decreasing with depth down to 5%	-
-			1	(7), horizontal, smooth, undulating, tight to 1/4" open	L	-	-
_	R10-NQ 5 ft	68	3			-	-
	110 -67.5		3			_	
			4	_			
-67.5			·	110.45-111.25' - Fracture zone, fragments to		_	D40.0
-			10	2"x4", most at 40 deg		_	R10:6 minutes
-	111.5			444.0.440.51. Franking and francische to	ፗ	111.5-116.5' - grayish orange, (10YR	-
-			>10	111.6-112.5' - Fracture zone, fragments to 2"x2", many horizontal bedding planes	I	- 7/4), fine to medium grained, strong	-
-					世	HCl reaction, extremely weak to very weak (R0 to R1), voids to 1/16" over	-
_			1		ш	<ul> <li>5-20% of rock increasing in coverage with depth, trace fossil casts to</li> </ul>	-
-	R11-NQ			113.5' - Bedding plane, horizontal, smooth,	世	1/4"x1/8", wavy bedding planes from	-
_	5 ft 92%	46	1	undulating, tight		- 111.5-112.6'	
115_			10	114.7-114.9' - Fracture zone, fragments to			_
-72. <del>5</del>			10	1-1/2"x2"		_	
_			2	115.8' - Fracture or mechanical break, 10	$ar{\Box}$	-	R11:6 minutes
-	116.5		NR	deg, rough, undulating, tight to 1/4" open 116.5-116.6, 116.85-116.95, 117.45-117.65,	F	No Recovery 116.1-116.5' Limestone	Finish drilling on 4/18/07 at 17:00, at 116.5' -
-			10	119.3-119.5' - Fracture zone (4), fragment to	厈	<ul> <li>116.5-120.7' - pale yellowish orange</li> </ul>	Resume drilling at 07:20 on
-				1-1/2"x1-1/2" 116.6, 116.85, 116.95, 117.1, 117.3, 117.45,	+	to pale yellowish brown, (10YR 8/2 to 10YR 6/2), medium to coarse	4/19/07 -
-			10	117.65, 119.3, 119.5, 119.8, 120.5' - Bedding plane or mechanical break (11), all rough to	+	<ul> <li>grained, strong HCl reaction, extremely weak to weak (R0 to R2),</li> </ul>	-
-	R12-NQ - 5 ft - 84%			smooth, undulating, open to 1/4" open,	#	voids to 3/16" over 5-25% of rock,	
_			10	except 120.5' <10 deg	1	<ul> <li>fossil casts to 1/2" diameter over 5% surface, trace cavities filled with dark</li> </ul>	
			10			material	
-77. <del>5</del>	-77.5 -					_	
_			1 NR			No Recovery 120.7-121.5'	R12:8 minutes
	121.5		INIC		$\vdash$		



PROJECT NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 2.5	ft bgs	on 4	/17/07 START : 4/17/2007 END : 4/	19/20	007 LOGGER : C. Wallestad				
≥∩≘	(%)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,			
H BE ATIC	TH.	D (%)	TUR -00-	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	3OLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD			
E S S	CORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.			
ООШ	075	22	шФ	THIOTALEOG, GOTA NOL GIVARANO, VALUE HOLLINGE	S	Limestone				
-			4	121.7-121.9' - Bedding plane, horizontal, smooth, planar to stepped, tight	Ħ	<ul> <li>121.5-126.2' - Same as 116.5-120.7'</li> </ul>				
-				-	H	except voids decreasing to 5% coverage with depth, highly	-			
-			4	122.65,122.7, 122.85, 123.0, 125.25' - Bedding plane or mechanical break (5), 0-5	Н	<ul> <li>fossiliferous from 121.5-124.4 with</li> </ul>	l -			
_	D12 NO			deg, smooth, undulating, tight	Ш	casts to 1/4"-1/2" over 15% of surface, solution cavities to 1/4"-1/2"	l -			
_	R13-NQ 5 ft	48	2	-	口	<ul> <li>over 5-7%, interval of fine grained</li> </ul>				
_	94%			124.4' - Fracture zone or mechanical break,	$\vdash$	moderately strong (R3) rock with distinct lamination and trace voids				
125_ -82.5			10	20 deg, smooth, undulating, tight	$\vdash$	— (up to 1/16") at 121.7-121.9'	_			
-02.5				124.5 - Fracture, 80 deg, smooth, planar, tight	Ħ	-	D42.5 minutes			
_			10	124.95' - Fracture, 30 deg, smooth, planar,	世	-	R13:5 minutes			
_	126.5		NR	tight 125.25-125.6' - Fracture zone, fragments to	Н	_ No Recovery 126.2-126.5'	-			
-			10	3"x1"	$\square$	Limestone - 126.5-131.0' - very pale orange,	-			
_				125.6' - Fracture, 65 deg, smooth, planar, open	ш	(10YR 8/2), fine to coarse grained,	-			
-			4	125.9-126.0' - Fracture zone, fragments to	団	strong HCl reaction, extremely weak to very weak (R0 to R1), grain size	_			
-	BAANO			1"x1-1/2" 126.5-127.0' - Fracture zone, some dark -	╀	becoming more coarse with depth,	-			
_	R14-NQ 5 ft	26	10	staining, fragments to 2"x1"	H	voids to 1/8" over 5-25% of surface, trace cavities to 1/2"x1" filled with	-			
_	90%			127.0, 127.3, 127.45, 128.0, 128.2, 128.35, 129.25, 129.4, 130.7, 130.8' - Bedding plane -	H	light colored infill, poorly fossiliferous with trace casts to 1/4"	-			
130 -87.5			4	or mechanical break (10), 0-5 deg, smooth,	H	- Will trace casts to 1/4	_			
-67.5				planar to undulating, tight 129.55, 129.95, 130.2' - Fractures, 50 deg,        -	Н	-	B4444 minutes			
_			2	smooth, undulating to planar, tight to 1/4"	П	No Decement 424 0 424 51	R14:4 minutes			
_	131.5		NR	open 129.7' - Fracture, rough, undulating, near -	団	No Recovery 131.0-131.5'	-			
_			10	vertical, open 131.75, 131.8, 131.95, 132.0, 132.35, 132.45'	Н	<b>Limestone</b> - 131.5-135.05' - Same as	-			
_				- Bedding plane (6), horizontal, smooth,	$\vdash$	126.5-131.0' except laminated at 134.25-134.9'				
_			2	planar, tight 131.85' - Fracture, vertical, smooth, planar	H	- -				
-	D45 NO			132.55, 132.95, 134.45, 135.15, 135.35' -	Ħ	-	-			
-	R15-NQ 5 ft	34	10	Bedding plane (5), horizontal, smooth, planar, tight	H	-	-			
_	84%			133.85, 134.25' - Bedding plane or	Н	-	-			
135 -92.5			5	mechanical break (2), 0-10 deg, rough, — undulating, 1/4" open	Щ					
-52.5			. 1	134.35-134.55' - Fracture zone, fragments to	Ш	135.05-135.7' - pale yellowish brown, (10YR 6/2), coarse grained, strong	R15:10 minutes			
-			NR	1"x2" 134.65' - Fracture, 30 deg, smooth, planar,	団	HCl reaction, voids to 1/8" over	- 10.10 11111111111111111111111111111111			
-	136.5			open	H	5-30% of rock (variable), trace fossil casts and molds to 1/4"x1/8", trace	-			
-			>10	136.6' - Fracture or mechanical break, vertical, smooth, undulating, tight	F	_ dark laminations	-			
-				136.75, 137.15, 137.55, 132.6, 138.05,' -	H	No Recovery 135.7-136.5' - Limestone	-			
-			>10	Bedding plane (5), horizontal, rough to smooth, undulating, many open (next to	H	_ 136.5-138.4' - Same as 135.05-135.7' except 10% fossil	-			
-	R16-NQ			fracture zone)	dash	<ul> <li>casts and molds to 1/2" diameter,</li> </ul>	-			
-	5 ft	38	>10	137.15-137.55, 138.2-138.75, 139.65-139.8' - Fracture zone (3), fragment to 1-1/2"x1/2"	П	and color darkens to moderate vellowish brown with depth (10YR	-			
-	78%			138.2, 138.25, 138.4. 138.85, 139.25, 139.65'	団	- 5/4)	-			
140 -97.5			10	- Bedding plane (6), horizontal, rough to smooth, undulating, many open (next to	H	138.4-138.85' - Same as 121.7-121.9' except pale yellowish	-			
"-				fracture zone)	$\sqcap$	– brown, (10YR 6/2)	R16:7 minutes			
-			NR	138.4-138.7' - Fracture zone, many bedding planes horizontal -	H	138.85-139.65' - Same as 136.5-138.4'	-			
	141.5				H	.55.6 166.1				



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

本文字   ポーサ   き   うじ   DEPTH, TYPE, ORIENTATION, ROUGHNESS, LEY   出版の   DEPTH, TYPE, ORIENTATION, ROUGHNESS, LEY   WEATHERING, HARDNESS, SMOOTHNESS, CAVING ROUGHNESS, CAVIN	WATER	LEVELS : 2.5	ft bgs	s on 4	/17/07 START : 4/17/2007 END : 4/	19/20	D7 LOGGER : C. Wallestad	
140.2" Mechanical treak or bedding plane,   141.7"   141.95, 142.85, 142.8, 143.2, 143.35,   143.65 - Fractures come attribute to the standard plane,   141.7"   141.95, 142.85, 142.8, 143.2, 143.35,   143.65 - Fracture zone, as 141.7"   141.95, 142.86, 142.8, 143.2, 143.35,   143.5   143.5   144.5   143.5	≥0≎	(%			DISCONTINUITIES	၂ ပွ	LITHOLOGY	COMMENTS
140.2" Mechanical break or bedding plane,   1417, 14195, 142.65, 1428, 143.2, 143.35,   143.6" F-racture zone   1417, 14195, 142.65, 1428, 143.2, 143.35,   143.6" F-racture zone   141.7" expensive plane   141.7" expensi	DEPTH BELOV SURFACE ANI ELEVATION (f	CORE RUN, LENGTH, AND RECOVERY (%	Ø	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
149.35, 149.45, 149.7, 148.75, 150.5, 150.7   149.35, 149.45, 149.37, 148.75, 150.5, 150.7   147.7   149.35, 149.45, 149.7, 148.75, 150.5, 150.7   147.7   149.35, 149.45, 149.37, 148.75, 150.5, 150.7   147.7   149.35, 149.45, 149.37, 148.75, 150.5, 150.7   149.37, 149	- - - - - 145	R17-NQ 5 ft 88%		2 4 >10 10 1 NR	5 deg, rough, undulating, 1/4" open 141.7, 141.95, 142.65, 142.8, 143.2, 143.35, 143.6' - Fractures or mechanical break (7), 0-20 deg, rough, undulating, horizontal-MB, tight to 1/2" open 143.65' - Fracture zone, as 141.7' except dark stain and tight 143.85-144.25' - Bedding plane, horizontal, smooth, undulating, open 144.4, 144.8, 144.9, 145.0, 145.8' - Bedding plane (5), horizontal, smooth 144.4-144.9' - Fracture zone, fragments to 1"x1/2" 146.5-146.55' - Fracture zone, fragments to		- 139.65-140.4' - yellowish gray with moderate yellowish brown infill, (5Y 7/2 with 10YR 5/4), fine grained, strong HCl reaction, medium strong (R3), voids to 1/8" over 5-15% surface, cavities to 2"x1" over 20-30% of rock with infill material, trace fossil casts and molds to 1/2"x1/16", infill is coarse grained weak rock (R2) with voids to 1/8" over 25-30% surface and moderate HCl reaction  No Recovery 140.4-141.5' Limestone  141.5-144.25' - Same as 139.65-140.4'	R17:11 minutes
Streeney Weak to medium strong (R0 to R3), (weaker rock from 147.7-149.5'), voids to 3/16' over 20-40% of rock, moderately fossiliferous with casts and molds to 1/4"x1/2" (many echinoderm casts), three 1" thick light colored, fine grained, medium strong (R3) layers at 146.65', 147.0', and 150.8' No Recovery 150.9-151.5' Limestone 151.5-155.7' - light olive gray to pale yellowish brown, (5Y 7/2 to 10YR 6/2), fine to coarse grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids to 1/16" over 5-20% of surface (variable), trace fossil casts, dark thick laminations from 153.8-154.25' No Recovery 155.7-156.5' Limestone 156.5-159.4' - Same as 146.5-150.9' except moderate yellowish brown, (10YR 5/4), and a 4"-thick, light colored, fine grained, medium strong (R3) rock layer at 157.05' No Recovery 159.4-161.5' R20:5 minutes		5 ft 88%		10 6 4 3	146.55, 147.5, 148.6, 148.7, 149.1, 149.3, 149.35, 149.45, 149.7, 148.75, 150.5, 150.7' 147.7' - Bedding plane, 10 deg, smooth, undulating, 1/2" open  150.1' - Mechanical break, (by drillers)  150.7' - Fracture, vertical, rough, undulating,		144.25-145.9' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, medium strong (R3), voids to 1/8" over 0-15% surface, dark 1/16" thick laminations over 20% of rock, voids increasing in percentage with depth No Recovery 145.9-146.5' Limestone 146.5-150.9' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), coarse grained,	R18:8 minutes
fragments to 2"x1" 156.8, 157.05, 157.2, 157.4, 158.2, 159.1' - Bedding plane, horizontal, smooth, planar to undulating, tight except adjacent to fracture zone  R20-NQ 5 ft 58% 10  NR  R20-NQ 11  NR  R20-NQ 5 ft 58% NR  R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 5 ft 58% R20-NQ 6 ft 750-NQ		R19-NQ 5 ft 84%		>10	_		(R0 to R3), (weaker rock from 147.7-149.5'), voids to 3/16" over 20-40% of rock, moderately fossiliferous with casts and molds to 1/4"x1/2" (many echinoderm casts), three 1" thick light colored, fine grained, medium strong (R3) layers at 146.65', 147.0', and 150.8'  No Recovery 150.9-151.5' Limestone  151.5-155.7' - light olive gray to pale yellowish brown, (5Y 7/2 to 10YR 6/2), fine to coarse grained, mild to moderate HCI reaction, weak to medium strong (R2 to R3), voids to	R19:7 minutes
		R20-NC 5 ft 58% 160 17.5		1 10	fragments to 2"x1" 156.8, 157.05, 157.2, 157.4, 158.2, 159.1' - Bedding plane, horizontal, smooth, planar to undulating, tight except adjacent to fracture zone		(variable), trace fossil casts, dark thick laminations from 153.8-154.25' No Recovery 155.7-156.5' Limestone 156.5-159.4' - Same as 146.5-150.9' except moderate yellowish brown, (10YR 5/4), and a 4"-thick, light colored, fine grained, medium strong (R3) rock layer at 157.05'	R20:5 minutes



PROJECT NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 2.5	ft bgs	on 4/	17/07 START : 4/17/2007 END : 4/	19/20	D7 LOGGER : C. Wallestad	
\$ □ \$	(%			DISCONTINUITIES	] <sub>Q</sub>	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SU	SHR	R O	# #	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Š	CHARACTERISTICS	DIOLO, ILOTALOULIO, LIO.
-			10	161.5-161.7' - Fracture zone, dark staining, fragments to 1/2" thick, all bedding planes at horizontal 162.25, 163.15, 163.4, 163.55, 165.05, 165.4' - Bedding plane (6), horizontal, smooth, undulating to planar, some with dark staining,		Limestone  161.5-162.5' - Same as 156.5-159.3' and 146.5-150.9' except pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, medium strong to weak (R3 to R2),	- - -
_	R21-NG 5 ft 80%	19	10	tight except next to fracture zone 162.45' - Fracture or mechanical break, <10 deg, rough, undulating, 1/2" open		5-15% voids <1/16", trace cavities <1/4" 162.5-165.5' - Same as	- -
165 -122.5	5070		10	162.6-162.85' - Fracture zone, some dark staining, parallel 45 deg fractures, tight — 162.7' - Fracture, 70 deg, smooth, undulating,		144.25-145.9' except grayish orange to pale yellowish brown, (10YR 7/4 o 10YR 6/2), very fine to fine grained,	_
_	166.5		NR	dark staining, tight 163.65' - Fracture, 70 deg, smooth, planar, dark staining, tight	H	moderate HCl reaction, strong (R4),  5% coverage of voids (<1/16"), increasing to 15% with depth	R21:8 minutes
-	100.5		>10	164.0-165.05' - Fracture zone, fragments to 3"x1" 166.5-167.5, 168.2-168.5, 169.2-164.65,		No Recovery 165.5-166.5'  Limestone  166.5-168.5' - Same as 161.5-162.5'	-
-			>10	170.35-170.55' - Fracture zone (4), fragments to 4"x1-1/2" 167.65,168.65' - Fractures (2), rough,	Ħ	-	-
-	R22-NQ 5 ft 90%	17	>10	undulating, no stain or infill, tight 168.2, 168.5, 168.85, 169.2, 169.8, 170.35, 178.55' - Bedding plane (7), horizontal, rough		168.5-171.0' - Same as 162.5-165.5' - except voids to 1/8" over 5-30% of surface (variable) and laminations	-
170 -127.5			>10	to smooth, undulating to planar, no stain or infill, tight except next to fracture zone169.75, 170.3' - Fractures (2), 70 deg,		throughout	_
			1	smooth, undulating, little dark staining, open and tight respectively	$\mathbb{H}$	-	R22:6 minutes
	171.5		NR			No Recovery 171.0-171.5'	]
-			3	171.55, 172.05, 172.1, 172.65, 173.2, 173.4, 173.5, 173.9, 175.55, 176.0, 176.1, 176.35' - Bedding plane (12), horizontal, smooth,		Limestone 171.5-176.4' - grayish orange, (10YR 7/4), fine grained, mild HCl reaction,	_
_			3	undulating to planar, some with dark staining, tight except by fracture zone		weak to medium strong (R2 to R3), voids to 3/16" over 5-20% surface (variable), trace fossil casts to 4.0"	
-	R23-NQ 5 ft 98%	72	>10	173.5-173.9, 176.35-176.4' - Fracture zone (2), fragments to 2"x2"		1/4"x1/2", trace cavities to 1"x1/2" - -	
175 <u> </u>			0	<u> </u>		-	R23:7 minutes
-			4		団	-	1720.7 Hilliutes -
-	176.5		<u>NR</u> 7	173.5-173.9, 170.35-176.4, 176.6, 176.9, 177.0, 177.3, 177.4, 177.6, 178.6, 178.65,	Ħ	No Recovery 176.4-176.5' Limestone	- -
-			2	179.5, 179.8, 179.85, 180.25, 180.35, 180.75' - Bedding plane (15), horizontal, smooth, undulating to planar, few with dark stains,		176.5-181.15' - Same as 171.5-176.4' except trace dark laminations at 177.4-177.7' and cavities to 1/2" diameter over 10% of	
-	R24-NQ 5 ft	36	3	tight except on fracture zones 176.95' - Fracture, vertical, smooth, undulating, tight	H	cavities to 1/2 diameter over 10% of rock from 180.5-180.95'	-
180 -137.5	93%		10	177.1' - Fracture, 80 deg, smooth, undulating, open 177.9' - Fracture, 25 deg, rough, undulating,		<u>-</u>	
-	101 5		2 NR	tight 178.85' - Fracture, horizontal, same as 177.9' except horizontal	<del>+,+</del>		R24:8 minutes
	181.5		INF	179.65' - same as 177.1' except rough		No Recovery 181.15-181.5'	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-06	SHEET	11	OF	11	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723774.1 N, 457972.0 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: P. Buchler

WATER	LEVELS : 2.5	ft bgs	s on 4/	/17/07 START : 4/17/2007 END : 4	/19/20	07 LOGGER : C. Wallestad	
≥0≎	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
ELO EANI	Ä, AND 3Y (%		ZES T	DESCRIPTION		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPT SURF	CORI	305	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	014			180.3' - Fracture, same as 179.65'	ŦŰ.	Limestone	
-			3	180.4-180.8' - Fracture zone, fragments to	F	<ul> <li>181.5-185.0' - Same as</li> </ul>	-
-				2"x2" 182.15' - Fracture, 20 deg, smooth,	Ħ	176.5-181.15' except layer of medium strong (R3) rock at	-
-			5	undulating, tight	世	– 183.1-183.65' ´	-
-	R25-NQ			182.3, 182.35, 182.6, 182.65, 183.05, 183.15, 183.65, 184.6, 184.7, 184.8' - Bedding plane	$\perp$	-	-
-	5 ft 100%	62	1	(10), horizontal, smooth, undulating to planar, some dark staining, tight except by fracture	╁	-	-
185	100 /6			zone	1	-	-
-142.5			10	183.0' - Fracture, 80 deg, rough, undulating, – open	世	 185.0-186.5' - pale yellowish brown,	_
-				184.6-184.85' - Fracture zone, fragments to	$\pm$	<ul> <li>(10YR 6/2), coarse grained, moderate HCl reaction, medium</li> </ul>	R25:9 minutes
-	106 5		0	1-1/2"x2" 185.3, 185.4' - Fractures (2), 30 deg and 20	╁	strong (R3), voids to 1/16" over	Total depth of boring is
-	186.5			deg, rough, undulating	Ť	15-25% of surface, fossil casts to 3/4"x1/2" over 20% of surface	186.5'
-					1	Bottom of Boring at 186.5 ft bgs on	-
-					1	- 4/19/2007	-
-					1	-	-
_					1	_	-
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-07	SHEET	1	OF	6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723499.5 N, 458024.9 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 1.25 ft l	ogs on 4/2	20/07	START : 4/20/2007
~ ~ ~				STANDARD	SOIL DESCRIPTION 0 COMMENTS
AND (#)	SAMPLE	INTERVA	· , ,	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DENIETY OR  MOISTURE CONTENT, RELATIVE DENIETY OR  DRILLING FASING, BRILLING FASING FASING, BRILLING FASING F
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
42.7	0.0				Topsoil (OL)  O 0 31 grayinh block (N3) maint erganic matter with
		1.1	SS-1	1-3-4 (7)	\  \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
_	1.5				Poorly Graded Sand With Organics (SP) 0.2-1.1' - brownish gray to grayish black, (5YR 4/1 to
-					N2), moist, loose, fine silica sand with 40% organic /
-	-				\fines, decreasing to 10% with depth
-	-				- 1
-	-				- 1
-	1				-
5	5.0				1 1
37.7	0.0				Silty Sand (SM)
		1.2	SS-2	2-1-1 (2)	5.0-6.2' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, very loose, no
_	6.5				HCl reaction, fine silica sand with 30% nonplastic
_					
-	-				
-					- 1
-					-
-	-				- 1
10	10.0				1 1
32.7					Fat Clay (CH)
_		0.4	SS-3	0-0-0 (0)	10.0-10.35' - grayish blue, (5PB 5/2), moist, very soft, high plasticity, no dilatancy, no HCl reaction, 10% fine
_	11.5				\silica sand
-	-				- 1
-	-				-
-	-				- 1
-					1 1
					]
15	15.0				
27.7	-			4-5-3	Silt (ML)  15.0-15.8' - grayish yellow, (5YR 8/4), wet, medium -
-	-	0.8	SS-4	(8)	stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 5-10% very fine sand, carbonate materials,
-	16.5				trace organics, 1/16" thick gray layer at 15.2'
-	-				
-	†				
1 -	1				1 1
	]				]
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20_					



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	GSC-07	CHEET	2 OF 6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723499.5 N, 458024.9 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 1.25 ft b	ogs on 4/2	20/07	START : 4/20/2007 END : 4/20/2007	LOGGER	: C.	Wallestad
				STANDARD	SOIL DESCRIPTION		G	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	. ,	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR	,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OF	Ŕ	BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPT SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALO	GY	SYM	INSTRUMENTATION
22.7	20.0				Silt (ML)	_	Ш	
		1.3	SS-5	3-3-3 (6)	20.0-21.3' - Same as 10.0-10.35' except greenish gray, (5G 6/1), medium stiff, no HCl reaction, witl	h		
	21.5			(-)	light olive yellow mottling (5Y 5/6) in 15-20% of s three concretions to 1"x1/4" between 20.0-20.5'	silt,	Ш	_
_					(and concluded to 1 x1) 1 Solved 1 20.0 20.0			_
-						_		-
-						-		-
-						-		-
-						-		-
25	25.0					_		<del>-</del>
17.7					Sandy Fat Clay (CH) 25.0-26.3' - light olive gray, (5YR 6/1), with mottli	ina		<del></del>
		1.3	SS-6	2-2-2 (4)	from 25.0-25.3', moist, soft, high plasticity, no	-		_
_	26.5			. ,	dilatancy, no HCl reaction, 30% fine silica sand, of coarse gravel-sized silica sand concretion	one /-		-
-								-
-						=		-
-						_		-
-						_		-
-						-		-
30	30.0							
12.7				2-4-7	Organic Soil (OH) 30.0-31.5' - olive black, (5Y 2/1), moist, stiff, med	dium –		-
_		1.5	SS-7	(11)	to high plasticity, slow dilatancy, no HCl reaction, 5-10% fine silica sand, fine silica sand lens from		\\\	-
_	31.5				30.45-30.55'			-
-						-		-
-						=		-
-						-		-
35 7.7	35.0				Organic Soil (OH)		))))	_
''' -		1.0	SS-8	3-5-3	35.0-36.0' - olive gray, (5Y 4/1), wet, medium stif	ff, -		-
-	36.5			(8)	medium to high plasticity, slow dilatancy, no HCl reaction, 40% fine silica sand		////	-
1 -	00.0							<del>-</del>
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1 40								
1								



PROJECT NUMBER:	BORING NUMBER:				
338884 FI	GSC-07	CHEET	2	OF	6

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723499.5 N, 458024.9 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER LEVELS: 1.25 ft bgs on 4/20/07					START : 4/20/2007	END: 4/20/2007	LOGGER	: C.	Wallestad
				STANDARD		SOIL DESCRIPTION		٠,	COMMENTS
중무운	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				Ö	
DEPTH BELOW SURFACE AND ELEVATION (ft)		RECOVE	. ,	TEST RESULTS	SOIL NAME,	USCS GROUP SYMBOL, COLO	OR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
A HE		RECOVE				ONTENT, RELATIVE DENSITY		BOI	DRILLING FLUID LOSS, TESTS, AND
무공근			#TYPE	6"-6"-6" (N)	CONSISTENCY	, SOIL STRUCTURE, MINERAL	LOGY	χ	INSTRUMENTATION
2.7	40.0			(11)	Sandy Organic S	Soil (OH)		222	
	40.0			6-6-7	40.0-41.1' - Same	e as 35.0-36.0' except 30-40%	6 fine −	}}}	-
l _		1.1	SS-9	(13)	silica sand	•		$\langle \langle \langle \langle \cdot \rangle \rangle \rangle \rangle$	_
	41.5						Ĩ		
-							1		_
-	1						- 1		-
-	-						-		-
_							4		-
_									_
_	1						1		_
<sub>45</sub> -	45.0						-		-
45 -2.3	45.0				Sandy Organic S	Soil (OH)	——————————————————————————————————————	,,,,	
				3-5-6	45.0-46.4' - Same	e as 40.0-41.1' except grayish	ı -[	}}}	-
l _	[	1.4	SS-10	(11)	orange, (10YR 7/-	4), mottled, silt stringers		\\\	_
	46.5			, ,				$\geq \geq \geq \geq$	
-					1		1		_
-	1						- 1		-
-	-								-
-							4		-
_									_
-	1						1		_
	500						- 1		-
50 -7.3	50.0				Interhedded Org	anic Soil With Silt (OH)	——— <u>—</u>	,,,,	
'				6-16-20	50.0-51.2' - Orgai	nic Soil (OH) is same as 30.0	)-31.5' -	}}}	-
l _		1.2	SS-11	(36)	except olive black	k (5Y 2/1), moist, hard, 10-15	% fine	\ \\	_
	51.5			, ,	silica sand; the Si	ilt (ML) is same as 15.0-15.8' asticity, no organics	except	777	
					\nard, no to low pie	asticity, no organics	/ ]		
-	1						1		-
-	-						-		-
-							-		-
l _									_
-	1						1		_
	55.0						- 1		-
55 <u> </u>	55.0				Silt (ML)			ш	
12.0		1.3	SS-12	18-28-50/3		yellowish brown to moderate	4		-
l _		1.3	33-12	(78/9")	yellowish brown, (	(10YR 6/2 to 10YR 5/4), wet,	hard,		_
	56.3				low plasticity, rapi	id dilatancy, moderate to stro hick organic layers at 55.25'	ng HCl	Щ	
-	1				55 8' respectively	, 5-10% fine sand	anu / T		_
-					(co.o respectively	, 0 1070 iii 0 00110	/ -		-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-07	SHEET	4	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723499.5 N, 458024.9 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 1.25 ft l	ogs on 4/2	20/07	START : 4/20/2007 END : 4/20/2007 LOGGE	R : 0	C. Wallestad
300				STANDARD	SOIL DESCRIPTION	ڻ	COMMENTS
SELOW E AND ION (#)	SAMPLE INTERVAL (ft)  BUCK RECOVERY (ft)  PENETRATIO TEST RESULT				SOIL NAME, USCS GROUP SYMBOL, COLOR,		DEPTH OF CASING, DRILLING RATE,
DEPTH BELOW SURFACE AND ELEVATION (ft)		RECOVE	#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLICLOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
<u>-17.3</u>	60.0			(N)	Silt (ML) 60.0-61.0' - Same as 55.0-56.3' except trace dark		
-	61.4	1.0	SS-13	17-42-50/5 (92/11")	mottling, 1/16" thick organic soil layer at 60.1', trace fine sand-sized and gravel-sized limestone fragments	Ш	Ц -
-	01.4					1	
-						-	-
-	-					1	
-						-	-
65	65.0					1	
-22. <del>3</del>	-	1.5	SS-14	5-10-14	Silt (ML) 65.0-66.5' - olive gray with grayish orange mottling, (5Y 4/1 with 10YR 7/4), wet, very stiff, low plasticity,	$\ $	-
-	66.5			(24)	rapid dilatancy, moderate HCl reaction, 5-10% fine sand, trace gravel-sized limestone fragments,	Ш	
-					\carbonate materials, 10% organic lamination	$\frac{1}{2}$	-
-						1	
-						1	-
						]	
70 -27.3	70.0				Interbedded Organic Soil And Silt (OH) 70.0-71.5' - Same as 50.0-51.2' except stiff, with	<b>}</b> ?	At 13:35 water level is 1.25' below ground surface
-	74.5	1.5	SS-15	6-6-5 (11)	irregular bedding and pockets of material	-	- Surface
-	71.5						
-						-	-
-						1	-
-						+	-
75_ -32.3	75.0				Organic Soil With Sand (OH)	<del>-</del>	
-		1.1	SS-16	2-4-10 (14)	75.0-76.1' - olive gray, (5Y 3/2), wet, stiff, medium to high plasticity, slow dilatancy, no HCl reaction, 20%	<b>-</b>	-
-	76.5			,	very fine silica sand, fine silica sand layer from 75.05-75.75'	-	-
-						1	
-						$\frac{1}{2}$	-
-						1	
80	_					$\frac{1}{2}$	-
						1	



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	GSC-07	SHEET	5	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723499.5 N, 458024.9 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT: Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER	LEVELS	: 1.25 ft l	ogs on 4/2	20/07	START : 4/20/2007 END : 4/20/2007 LOGGER	R : C.	Wallestad
				STANDARD	SOIL DESCRIPTION	G	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR	BOLI	DRILLING FLUID LOSS, TESTS, AND
DEPT SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYM	INSTRUMENTATION
-37.3	80.0				Silt (ML)	Ш	
		1.0	SS-17	10-28-16 (44)	80.0-81.0' - grayish orange, (10YR 7/4), wet, hard, low - plasticity, rapid dilatancy, moderate HCl reaction,		
_	81.5				trace coarse gravel-sized limestone fragment, carbonate materials, 1/8" thick dark layer at 80.3'		_
_					-		-
_					-	l	-
-					-	ł	-
-					-		-
-					-	l	-
85	85.0				-	1	-
-42.3					Sandy Organic Soil (OH) 85.0-86.2' - olive black, (5Y 2/1), wet, very soft,	<i>}}}&lt;</i>	_
_		1.2	SS-18	0-0-0 (0)	medium to high plasticity, slow dilatancy, no HCl	<b>}</b> }}	_
_	86.5				reaction, 30-40% fine silica sand	777.	-
-					-	-	-
-					-		-
_					-		-
_					-		-
_					-		<u> </u>
90	90.0						
-47.3				0-0-0	<b>Sandy Organic Soil (OH)</b> 90.0-91.3' - Same as 85.0-86.2' except 5-50% sand -	\$\$\$	-
-		1.3	SS-19	(0)	decreasing with depth	$\langle \rangle \rangle$	-
-	91.5				-	•	-
-					-		-
-					<del>-</del>		-
-					-		-
95 <u> </u>	95.0			05.50/5	Silt With Limestone Fragments (ML)	Ш	
32.3	95.9	0.6	SS-20	25-50/5 (75/11")	95.0-95.6' - pale yellowish brown, (10YR 6/2), wet, hard, nonplastic, rapid dilatancy, moderate HCl	Ш	-
-	00.0				\reaction, carbonate, 1/16"-3/16" thick silt/limestone	l	-
1 -					interbeds	1	·
-					-		_
-					-		-
-					-	-	-
100					-	1	-
100							
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-07	SHEET	6	OF	6	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723499.5 N, 458024.9 E (NAD83)

ELEVATION: 42.7 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 1.25 ft b	ogs on 4/2	20/07	START : 4/20/2007 END : 4/20/2007 LO	GGEF	R : C.	Wallestad
				STANDARD	SOIL DESCRIPTION		g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LICOS OPOLID OVARDOL COLOR		SYMBOLIC LOG	DEDTILOF CASING POLITING DATE
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		3 S	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	,	SYMI	INSTRUMENTATION
-57.3	100:9	0.4	SS-21	50/6	Silt (ML)			Finished drilling/sampling at 15:30 on
_	100.0			(50/6")	100.0-100.4' - grayish orange, (10YR 7/4), moist, hard, low plasticity, slow to rapid dilatancy, modera	te /		4/20/07 Total depth of boring 100.5' Surface collapse; filled with grout
					HCl reaction, carbonate material, organic soil layer 3/16" thick at 100.1' and 100.3'	s   -		Surface collapse; filled with grout
-					Bottom of Boring at 100.5 ft bgs on 4/20/2007			_
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_						-	ł	-
-						-	ł	-
-						-	1	-
105						-	ł	-
-62.3							1	_
						-	1	_
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_						_	1	_
-						_	1	-
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110						-	1	-
-67.3							1	_
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PROJECT NUMBER:	BORING NUMBER:		
338884 FI	GSC-07A	CHEET	1 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER	LEVELS	: 5.0 ft b	gs on 4/2	1/07 5	START: 4/21/2007 END: 4/26/2007 LOGG	ER : (	C. Wallestad, R. McComb
				STANDARD	SOIL DESCRIPTION		COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			
JEE JEE		RECOVE	RY (ft)	120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	2	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	Jak.	INSTRUMENTATION
				(N)		Ú	
43.1	0.0			1-2-3	Poorly Graded Sand With Organics (SP) 0.0-1.1' - brownish black to brownish gray, (5YR 2/1 to		4/21/07 at 07:55 start SPT
_		1.1	SS-1	(5)	5YR 4/1), moist, loose, fine silica sand, 20% organic	1	4
_	1.5				material decreasing with depth	$\mathcal{T}$	
_						1	_
_						1	_
_						4	
_						4	
_						4	_
_						4	_
5	5.0						_
38.1				2-2-3	Silty Sand (SM) 5.0-6.1' - moderate yellowish brown to grayish orange,		4
_		1.1	SS-2	(5)	(10YR 5/4 to 10YR 7/4), wet, loose, fine silica sand,		_
_	6.5				20% nonplastic fines, trace organics as roots	$\top$	
_						4	_
_						4	_
_						4	_
_						4	-
_						1	
_						1	_
10	10.0					1.	_
33.1				3-8-10	Silt (ML) 10.0-11.1' - grayish orange, (5YR 7/4), wet, very stiff,	$\parallel$	_
_		1.1	SS-3	(18)	nonplastic, rapid dilatancy, moderate HCl reaction,		_
_	11.5				10% very fine sand-sized, all carbonate	$\top$	
_						4	
_						4	_
_						1	-
_						1	
-						1	
-						1	
15	15.0		00.1	EO/F	C:IA (MIL)	-	
28.1	15.4	0.3	SS-4	50/5 (50/5")	Silt (ML) \(\begin{align*} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	∕╬	┧
_						4	-
_						1	
-						1	
-						1	
-						1	
-						1	-
-						4	
_						4	-
20						$\bot$	
L						L_	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-07A	SHEET	2	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

DRILLING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

DRILLIN	G METH	OD AND	EQUIPM	ENT : Dietrich D-	60 S/N 232, mud rotary, cathead, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical
WATER	LEVELS	: 5.0 ft b	gs on 4/2	1/07	START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb
l.				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	AL (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
HH		RECOVE	ERY (ft)	1201 NESOLIS	SOIL NAME, USCS GROUP SYMBOL, COLOR,  DEPTH OF CASING, DRILLING RATE,
H A Y			<u> </u>	011 011 011	MOISTURE CONTENT, RELATIVE DENSITY OR ONSISTENCY, SOIL STRUCTURE, MINERALOGY INSTRUMENTATION
			#TYPE	6"-6"-6" (N)	Solvatoria, soliz officoroniz, minici vizoci
23.1	20.0			` '	Silt (ML)
-		0.9	SS-5	5-10-15	20.0-20.9' - Same as 10.0-11.1' except dark yellowish -
-		0.9	33-3	(25)	orange (10YR 6/6), 1/8" thick layer at 20.5', very stiff, fine to coarse sand-sized limestone fragments at
-	21.5				\20.0-20.3' and 20.75-20.9'
_					<del></del>
_					<u> </u>
_					1
_					† <b> </b>
-	05.0				
25 <u> </u>	25.0				Sandy Silt (ML)
-			00.0	10-20-23	25.0-25.9' - grayish orange, (10YR 7/4), wet, hard,
-		0.9	SS-6	(43)	nonplastic, rapid dilatancy, moderate HCl reaction, 30% fine to coarse sand-sized, carbonate materials
_	26.5				- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
_					
					] [
_					1
_					<b>1</b>
-					
30 13.1	30.0	0.2	SS-7	50/4	Silty Sand (SM)
-	- 00.0		1007	(50/4")	│ \ 30.0-30.2' - grayish orange, (10YR 7/4), wet, very │
_					dense, moderate HCl reaction, fine to coarse
_					sand-sized, 35% nonplastic fines, 10% fine gravel-sized limestone fragments, carbonate
_					materials
· <del>-</del>					]
_					<b>1</b>
-					
-					
					-
35 8.1	35.0 35.3	0.3	SS-8	50/4	Silty Sand (SM)  HW casing set at 35 ft below ground surface
-		\		(50/4")	\ 35.0-35.3' - moderate olive brown, (5Y 4/4), wet, very /-
_					\ dense, moderate HCl reaction, fine to coarse
_				ĺ	\sand-sized, 25% nonplastic fines, trace fine gravel-sized limestone, carbonate materials
_					<u> </u>
					]
_					11
_	40.0			ĺ	<b>1  </b>
-	40.0	0.1	SS-9	50/2	_ Limestone Fragments
-				(50/2")	\\\ 40.0-40.05' - moderate yellowish brown, (10YR 5/4), \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
					\moderate HCl reaction, coarse sand-sized fragments / _
40					Begin Rock Coring at 40.0 ft bgs
					See the next sheet for the rock core log
					l



PROJECT NUMBER:

33884.FL

BORING NUMBER:

GSC-07A

SHEET 3 OF 14

**ROCK CORE LOG** 

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				IEM : Dietitch D-30 3/N 232, Midd Totally, NQ tools, HW			
WATER	LEVELS : 5.0	ft bg	s on 4/		26/20	· ·	
≥0€	[		,	DISCONTINUITIES	၂ ပွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACING
뿝병은	L Y.Y.	(%) <sub>Q</sub>	REC	DEDTIL TYPE OPIENTATION POLICINESS	<b>1</b> ∺	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
F A A	) See	0	SCT FC	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	₽	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SCE		A Q	PEF.	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S N S	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
3.1	40.0 R1-NQ				H	Limestone	R1:2 minutes
	1 ft	0	1			- 40.0-40.85' - light olive gray, (5Y	-
l _	41.0 85%		NR.	40.6' - Fracture, 70 deg, smooth, undulating	$\vdash$	5/2), medium to coarse grained,	_
				to stepped, tight 41.0-41.4' - Fracture zone, fragments to 2"x1"	Н	strong HCl reaction, weak (R2),	
_	1		>10	. •	F	<ul> <li>mottled with grayish orange (10YR 7/4), voids to 1/8" over 15-25% of</li> </ul>	1
-	-			41.75' - Bedding plane or mechanical break,	╁┴	surface, trace cavities to 1"x1/4",	-
_	.		0	horizontal, smooth, undulating, tight	仜	- trace fossils to 1/2"x1/4"	-
_	]				ᅪ	No Recovery 40.85-41.0'	_
	R2-NQ	•	0			Limestone - 41.0-43.7' - light olive gray, (5Y 5/2),	
-	5 ft 54%	0			Ш	fine to coarse grained, weak to	1
-	1				T	moderate HCl reaction, extremely	1
-	-					<ul> <li>weak (R0), poorly competent, trace</li> </ul>	-
45			NR	_	₽	voids to 1/16", unconsolidated sandy silt from 42.5-43.55'	
-1.9						No Recovery 43.7-46.0'	R2:2 minutes
	46.0				$\vdash$	- 1.0 1.000 to., 10	
_					ĦП	Sandy Silt (ML)	1 -
-	-		N/A		1	- 46.0-48.25' - moderate yellowish	-
-	-				-	brown, (10YR 5/4), wet, medium grained, strong HCl reaction,	-
_			N/A		4	- carbonate silt with 20-50% carbonate	_
						54.55.14.6 5.11 11.1. <b>2</b> 5 5575 54.135.14.6	
	R3-NQ				Ш	_ Limestone	Ī
-	5 ft 94%	24	>10	•		48.25-50.7' - moderate yellowish	1
-	9770			48.95, 49.05' - Bedding plane or mechanical	╙	brown, (10YR 5/4), medium to	-
-			4	break (2), horizontal, smooth, planar, tight to	+	_ coarse grained, moderate HCl	-
50 -6.9				1/4" open 49.0' - Fracture or mechanical break, vertical, —	₽-	reaction, highly competent, voids to 1/8" over 15-45% of rock, trace fossil	
-6.9			3	smooth, planar, open	┵	casts to 3/16" diameter	R3:3 minutes
	51.0		NR	49.8, 50.1' - Fractures (2), 60 deg, rough,		No Recovery 50.7-51.0'	
-				undulating, tight	$\top$	Limestone	1
-	-		0	50.15' - Fracture, 30 deg, rough, undulating, tight	П	51.0-56.0' - grayish orange, (10YR	-
-	1			50.4' - Fracture, 80 deg, rough, undulating,	╁	7/4), fine to coarse grained, moderate to weak HCl reaction,	-
-			3	tight		extremely weak to weak (R0 to R2),	_
1 _				50.5' - Fracture, 50 deg, rough, undulating,	Ь	voids to 1/8" over 10-40% of rock,	_
	R4-NQ			tight 52.1, 52.5, 52.85, 53.98, 54.2, 54.75, 55.4' -		trace fossils to 1/8" diameter,	
1 -	5 ft 100%	11	1	Bedding plane or mechanical break (7),	$\vdash$	<ul> <li>extremely weak, fine grained rock at 53.5-54.2' and 55.4-55.6', voids over</li> </ul>	]
-	''			horizontal and 10 deg, smooth, undulating,		10-15% of surface, 25-30% dark	R4:4 minutes
			2	tight	╂┯	<ul> <li>laminations 1/16"-3/16" thick</li> </ul>	-
55 <u> </u>	.			_	Ľ		
-11.9			1		$\perp$	<u>-</u>	
	56.0		<u>L</u>		上一		
1 -					<b>—</b>	56.0-56.3' - Same as 51.0-56.0'	1
_	1		N/A		<b>1</b>	Silt (ML)	1
-					1	<ul><li>56.3-57.7' - grayish orange, (10YR 7/4), fine grained, strong HCl</li></ul>	-
-			1	57.4, 59.15' - Bedding plane or mechanical	4[[[	reaction, extremely weak (R0),	] -
-	. <u>  </u>			break (2), horizontal, smooth, undulating,	$\Box$	grading to extremely weak (R0)	-
I _	R5-NQ 5 ft	34	0	tight to 1/4" open	$\vdash$	limestone, thinly bedded with 1/16" thick, dark laminations (possible	
	98%	J <del>4</del>				organics) over 25% of surface	
	1				╁	Limestone	]
			1		<b>1</b> ,,,	57.7-59.7' - Same as 51.0-56.0'	-
60				-	$\mathbf{H}^{+++}$		-
					1		
					1		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-07A

SHEET 4 OF 14

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				ILIVI . Dietrich D-50 5/14 252, mad rotary, ng tools, my					ONENTATION: Vettical
WATER	LEVELS : 5.0	ft bg	s on 4		26/20	007	· · · · · · · · · · · · · · · · · · ·	сСс	omb
>				DISCONTINUITIES	G	L	LITHOLOGY		COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	Γ	ROCK TYPE, COLOR,		
ᇤ兴현	ER, A	9	FRACTURES PER FOOT		음	ı	MINERALOGY, TEXTURE,		SIZE AND DEPTH OF CASING,
ΞĂΕ	E H STE	(%) Q	FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BO	ı	WEATHERING, HARDNESS,		FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
FR.F	RNA	Ø	RA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	₹	ı	AND ROCK MASS CHARACTERISTICS		DROPS, TEST RESULTS, ETC.
	078	œ	ΗД	THORNESO, CONTROL OF MINITO, 7 MAD THORNING	S	L			
-16.9			N/A		ш	╀	Silt (ML)	Н	R5:5 minutes
	64.0		IN/A	-	╁	t	59.7-60.3' - grayish orange, (10YR 7/4), strong HCl reaction, extremely		7
-	61.0		NR/	-	仜	1	weak (R0), grading to extremely	П	-
-			1		Ь	₽	weak (R0) limestone, thinly bedded	Н	_
				61.5, 65.8' - Bedding plane or mechanical		ı	with 1/16" thick, dark laminations	Ш	
				break (2), 20 deg, smooth, undulating to	1111	Γ	(possible organics) over 25% of	Ш	7
-	-		2	62.3' - Bedding plane or mechanical break,	ш	ŧ	surface	Н	-
-				horizontal, smooth, undulating to planar	₽	╁	Limestone	Ш	_
	R6-NQ 5 ft	84	N/A	62.5' - Bedding plane or mechanical break, 5		1	60.3-60.9' - Same as 51.0-56.0'	Ш	
	98%	04	IN/A	deg, smooth, undulating to planar	$\vdash$	F	No Recovery 60.9-61.0' Limestone	Ш	
-	1			-	┰	t	61.0-61.4' - pale yellowish brown,	Ш	-
-			N/A	-		1	(10YR 6/2), fine to coarse grained,	Ш	-
65					Ιпп	t	moderate HCl reaction, very weak to	ΙН	
-21.9						ı	weak (R1 to R2), competent, voids to	$\  \ $	R6:9 minutes
-	66.0		1	-	1111	r	1/8" over 5-15% of rock, trace cavities to 1.0' diameter most filled	$\  \ $	7
-	66.0		NR)	-	₩	╁	with extremely weak rock (R0), few	ΙН	-
-			2	66.15, 66.8' - Bedding plane or mechanical		1	open, trace dark laminations		_
			-	break (2), horizontal, smooth, undulating,		1	Silt (ML)		
-				tight to 1/4" open	Н	Ŧ	61.4-62.6' - poorly competent as	Ш	Ī
-	-		1	-			56.3-57.7'	Ш	-
-				-	ш	Ł	Limestone	Ш	_
l _	R7-NQ 5 ft	57	0		ь	Ł	62.6-64.8' - pale yellowish brown,	Ш	
	100%	31	"				(10YR 6/2), fine to coarse grained, moderate HCl reaction, very weak to		
-	1			68.85' - Fracture or mechanical break, 20	╙	╁	weak (R1 to R2), competent, voids to		-
-	-		1	deg, rough, undulating to stepped, tight	╁	╁	1/8" over 5-15% of rock, trace		-
70				69.5, 70.4' - Bedding plane or mechanical break (2), horizontal, smooth, undulating, —		L	cavities to 1.0' diameter most filled		
-26.9				tight to 1/4" open		-	with extremely weak rock (R0), few		R7:3 minutes
	71.0		1		h	t	open, trace dark laminations		7
-	71.0			74 4 70 FF 70 01 Dodding plans or		ŀ	(possible organics)		-
_			1	71.1, 73.55, 73.8' - Bedding plane or mechanical break (3), horizontal, smooth,	₽	╀	Silt (ML) 64.8-65.9' - poorly competent as		_
l _				undulating to planar, 1/16" thick infill of fines	ь	Ł	56.3-57.7'		
				infill, tight		1	No Recovery 65.9-66.0'		
-			2	72.05' - Fracture, 55 deg, rough, undulating,	╙	十	Limestone		-
-	D0 NO			tight .	┢	1	66.0-71.0' - moderate yellowish		-
-	R8-NQ 5 ft	70	10	72.55' - Fracture, 70 deg, rough, undulating,	F	ļ	brown, (10YR 5/4), moderate to		_
1	100%	•	L	tight 73.8-74.3' - Fracture zone -	片	1	strong HCl reaction, extremely weak to weak (R0 to R2), voids to 1/16"		
1 -	]			73.0-74.3 - Flacture 2011e	Ш	1	over 0-25% of rock, trace fossil		1
I			10	·	⊣	╁	casts, trace dark laminations,		-
75_				74.9' - Fracture, 85 deg, smooth, undulating	╀	╁	_ extremely weak from 66-66.6',		D9:6 minutes
-31.9	]		1	75.05' - Fracture, 60 deg, smooth, undulating		1	67.3-68.3', and 69.1-71.0'		R8:6 minutes
	76.0			75.4' - Fracture, 50 deg, smooth, undulating	<b> </b> -	1	71.0-72.6' - Same as 66.0-71.0' except extremely weak (R0)		
-				<u> </u>	t	t	72.6-73.5' - moderate yellowish		-
-	-		0	-	ш	ŀ	brown, (10YR 5/4), coarse grained,		-
I -					┢	╁	moderate HCl reaction, weak to		_
			1	77.25, 78.1' - Bedding plane or mechanical	Ľ	1	medium strong (R2 to R3),		
1 -				break (2), 85 deg, smooth, planar, tight	Ш	T	competent, voids to 3/16" over 15-30% of rock, fossil casts to		1
-	R9-NQ				╁	╁	3/16"x3/8" over 5-15% of rock, trace		-
-	5 ft	77	2	-	Ľ	1	cavities to 1/4"x1.5', trace dark		-
I _	96%			78.7' - Fracture, 30 deg, rough, undulating,	Ш	L	material (possible organics)		_
			[ , ]	tight	$\vdash$	1	73.5-74.4 - Same as 71.0-72.6		
90	]		1	79.25-79.85' - Fracture zone, fragments to 1"	Ľ	t			-
80				diameter	╀	t	_	-	
1					1	1			



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-07A

SHEET 5 OF 14

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				VICENT : DIEUTICH D-30 S/N 232, HIND TOTALLY, NQ TOOLS, HW		-	ORIENTATION . Vertical
WATER	LEVELS : 5.0	υπ <u>og</u> I	s on 4		26/20		
30₽	<u>(</u> %			DISCONTINUITIES	ဗ္ဂ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
표병은	DA F. F.	(%) 🛭	158	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	<b>7</b>	MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
₽₽₩	#P.00		PAP.	PLANARITY, INFILLING MATERIAL AND	₩ WBC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
	SHR	a Q	E H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYI	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-36.9				79.75, 79.85' - Mechanical break or fractures	Н	Limestone	R9:8 minutes
-			>10	(2), horizontal, rough, undulating, associated		- 74.4-76.0' - moderate yellowish	-
l -	81.0		NR.	with dissolution cavity, open	Н	brown, (10YR 5/4), coarse grained,	
			$\vdash$	80.4' - Fracture, 75 deg, rough, associated	П	moderate HCl reaction, weak to	
_	1		>10	with dissolution cavity, open 80.4-80.8' - Fracture zone, fragments 1.5"x2"	П	<ul> <li>medium strong (R2 to R3), competent, voids to 3/16" over</li> </ul>	1
-	-			81.0-81.05, 81.55-81.95' - Fracture zone (2),	Н	15-30% of rock, fossil casts to	1
l -			2	fragments 1.5"x2"	ш	- 3/16"x3/8" over 5-15% of rock, trace	_
				81.05, 81.55, 81.95' - Bedding plane or	Ы	cavities to 1/4"x1.5", trace dark	
	R10-NQ			mechanical break (3), horizontal, rough,	Н	material (possible organics)	
-	5 ft	43	3	undulating, open by fracture zones 81.45' - Fracture or mechanical break, 40	ш	<ul> <li>76.0-77.25' - Same as 74.4-76.0' except voids decreasing with depth</li> </ul>	1
-	85%			deg, rough, undulating, tight to 1/4" open	Н	77.25-78.1' - Same as 56.3-57.7'	-
_			4	82.1, 83.6' - Bedding plane or mechanical	Н	except trace dark laminations	]
85				break (2), rough, undulating, tight to 1/4"	Ш	(possible organics)	1
-41.9	]		0	open	$\mathbb{H}$	78.1-79.6' - dark yellow orange to	R10:7 minutes
-			NR	82.8' - Fracture or mechanical break, 30 deg,	Ш	moderate yellowish brown, (10YR 6/6	1 +
-	86.0	-	<u> </u>	smooth, planar, tight 83.45' - Fracture or joint, 60 deg, undulating,	ш	to 10YR 5/4), fine grained, strong HCl reaction, weak to medium strong	1 -
l _			2	as 81.5'	Н	(R2 to R3), voids to 1/8" over	
			_	84.25' - Bedding plane, <10 deg, smooth,		20-45% of rock, trace fossil casts	
-	1			undulating, apparently along possible organic	ш	1/4" diameter, trace cavities to 1"x2"	1
-	-		10	layer, tight	Н	with competent, medium strong rock	-
_				84.85' - Fracture or mechanical break, 40 deg, rough, undulating, 1/4" open		(R3) infill □ 79.6-80.8' - grayish orange to pale	_
	R11-NQ		١	85.0' - 20 deg	Ш	_ yellowish brown, (10YR 7/4 to 10YR	
	5 ft 87%	51	2	86.2, 87.35, 88.9, 89.7' - Bedding plane or	Н	6/2), moderate HCl reaction, medium	1
-	1 0.70			mechanical break (4), horizontal, smooth,		strong (R3), competent, voids to	-
-	-		10	undulating to planar, tight except for fracture	Н	3/16" over 0-35% of rock, cavities to	-
90			L	zone 86.45, 86.65' - Fractures or mechanical break —	ш	3"x1" over 25-30% of rock, cavities partially filled with weak rock infill,	
-46.9			10	(2), 50 deg, rough, undulating, tight to 1"	Н	trace fossil casts to 1/2"x1/4"	R11:8 minutes
1 -	91.0		NR	open	Н	No Recovery 80.8-81.0'	
-	91.0			87.2' - Fracture or mechanical break, 20 deg,	ш	- Limestone	-
-	-		2	smooth, undulating, open by fracture zone	Н	81.0-81.7' - Same as 78.1-79.6'	-
_				87.2-87.35, 89.7-90.35' - Fracture zone (2), 20 deg, up to 2"x3" diameter	╨	81.7-82.1' - Same as 79.6-80.8' - 82.1-83.3' - Same as 77.25-78.1'	_
				88.75' - Fracture, 85 deg, smooth, undulating		83.3-85.25' - Same as 81.0-81.7'	
	[		2	89.0' - Fracture, 50 deg, smooth, undulating	$\mathbb{H}$	except trace 1/16"-3/16" thick dark	1
-	R12-NQ	l )		91.6' - Fracture, 20 deg, smooth, planar, tight	世	- laminations (possible organics)	1
-	5 ft	28	10	91.65' - Fracture, 70 deg, smooth, undulating, tight	₽₽	No Recovery 85.25-86.0' Limestone	1 -
I -	74%			92.55' - Fracture, 35 deg, smooth, planar,	Н	- 86.0-90.35' - pale yellowish brown to	]
			10	tight	П	moderate yellowish brown, (10YR 6/2	
95	]		<u> </u>	92.65' - Fracture, 60 deg, smooth, planar,	Ш	to 10YR 5/4), medium grained,	1
-51.9			l	tight —	ш	— moderate HCl reaction, very weak to	R12:11 minutes —
-			NR	93.05' - Fracture, 60 deg, smooth, undulating, tight	口	medium strong (R1 to R3), competent, voids to 3/16" over	
	96.0			93.2' - Fracture, 80 deg, smooth, undulating,	Н	20-30% of rock, trace fossil casts to	]
				tight	Ш	3/16" diameter, trace light gray infill	1
-	1		>10	93.55' - Fracture or mechanical break, 20	$\vdash$	material (medium strong)	1
1 -				deg, rough, undulating, 1/16"-3/16" open	Н	No Recovery 90.35-91.0'	1
-			10	93.55-94.25' - Fracture zone, fragments to 1.5"x2.5", infill in cavities	ш	<b>Limestone</b> - 91.0-93.55' - Same as 86.0-90.35'	1 4
			L	94.25' - Bedding plane, horizontal, smooth,	Н	except less voids (10-25%) than at	
1	R13-NQ			planar, open	Ľ	92.0-92.5'	1
1 -	5 ft	15	3	96.0-96.75' - Fracture zone, dark, fragments	ш	<del>-</del>	1 1
-	70%		<del>-</del>	to 3"x1", stain on many faces	H	-	-
_			4	96.75' - Bedding plane, horizontal, smooth, planar, tight		<del>-</del>	]
100				pianai, tigrit	Ш		
					1		
				-			



PROJECT NUMBER: BORING NUMBER: 338884.FL

GSC-07A

SHEET 6 OF 14

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION: Vertical

WATER	LEVELS: 5.0	ft bgs	s on 4/	21/07 START : 4/21/2007 END : 4/	26/200	DOT LOGGER: C. Wallestad, R. McC	omb
≥∩≘	_ (%			DISCONTINUITIES	ဖွ	LITHOLOGY	COMMENTS
BELO SE ANI SON (#	UN, H, AND ERY (%	(%	JRES OT	DESCRIPTION		ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-56.9 _			NR	97.1' - Fracture, 85 deg, smooth, undulating, dark, tight	Н	93.55-94.7' - grayish orange, (10YR - 7/4), fine grained, strong HCl	R13:9 minutes
_	101.0			97.15-97.25' - Bedding plane, horizontal,	Н	reaction, medium strong (R3),	07:55
_				smooth, planar, 1" thick silt, tight 97.35' - Fracture, 75 deg, smooth, undulating,	щ	competent, voids to 1/8" over 0-15% of surface, trace cavities to 1/4"	07:55 water level = 2.5' below ground surface -
-				dark, tight 97.6-97.7' - Fracture zone, fragments to	Ш	diameter, tight plastic clay infilling in some cavities	NW casing set at 101 ft below ground surface
-			ND	1"x3/4"		- No Recovery 94.7-96.0'	No recovery at 101.0-104.3
_			NR	98.5' - Fracture, 20 deg, rough, undulating,	$\perp$	Limestone 96.0-97.2' - very pale orange, (10YR	due to core barrel blockage
_	R14-NQ 5 ft	9		tight 98.85' - Fracture, 70 deg, smooth, undulating,	Ħ	- 8/2), fine grained, moderate HCl	<del>-</del>
_	34%			dark, tight	Ш	reaction, medium strong (R3), voids	_
_			- 10	98.9, 99.0' - Bedding plane or mechanical break (2), horizontal, smooth, planar, tight	ш	to 1/16" over 0-10% of surface, dark staining on broken face	_
105			>10	99.15' - Fracture, 20 deg, rough, undulating, tight	щ	97.2-97.7' - very pale orange, (10YR 8/2), fine grained, strong HCl	
-61. <del>9</del> -			3	99.3' - Fracture, 40 deg, smooth, undulating,	Щ	reaction, extremely weak to weak	R14:10 minutes
_	106.0			dark, tight 99.8' - Fracture, 75 deg, smooth, undulating,	ш	(R0 to R2), competent, voids to 1/16" over 10-20% of rock, moderately	_
_			>10	open	Н	fossiliferous with casts and molds to	_
_				104.3-104.7' - Fracture zone, dark staining on some faces, fragments to 3/4"x1.5"	Ħ	3/16"x3/8", trace dark inclusions 97.7-98.9' - dark yellow orange to	_
_			>10	104.7, 104.9, 105.0, 105.15' - Mechanical	H	_ moderate yellowish brown, (10YR 6/6	_
_				break (4), horizontal, smooth, undulating 104.95' - Fracture or mechanical break, 40		to 10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3),	_
_	R15-NQ 5 ft	0	>10	deg, smooth, planar, dark, tight	₽	competent, voids between 1/16"-1/8"	_
_	66%	-		105.2' - Bedding plane, horizontal, smooth, planar, dark, open	Ш	over 30%, few secondary cavity infilling up to 1/2", strong HCl	_
_			0	105.4, 105.75' - Mechanical break (2)	ш	reaction on infilling (similar to	_
110_			NID	105.7' - Bedding plane, horizontal, smooth, undulating, tight to 1/2" open —	Ш	78.1-79.6') 98.9-99.5' - Same as 96.0-97.2'	
-66. <del>9</del> -			NR	106.25, 107.2, 109.2' - Fractures (3), 80 deg,	Н	No Recovery 99.5-104.3'	R15:4 minutes
_	111.0			smooth, undulating, dark, open (missing opposite face)	H	Limestone - 104.3-105.7' - grayish orange, (10YR	=
_			10	106.4-107.1, 107.5-109.0' - Fracture zone	H	7/4), fine grained, moderate to strong	=
_				(2), fragments to 3"x2", some dark staining on faces in lower interval	Ш	HCl reaction, medium strong (R3), medium strong (R3) at 105.4', voids	=
_			0	109.0' - Fracture, 20 deg, smooth, undulating,	Н	up to 1/16" over 0-30% (mostly	_
_				dark, missing opposite face 111.0-111.15' - Fracture zone, fragments to	Ш	0-5%) of surface, trace dark laminations 3/16" thick	=
_	R16-NQ 5 ft	46	10	1"x1/4"	Ш	105.7-106.0' - fine to medium	=
_	94%			111.15' - Mechanical break or bedding plane, horizontal, rough, undulating, open (missing	Ш	grained, moderate to strong HCl reaction, extremely weak to very	_
_			3	opposite face)	╆┼	weak (R0 to R1), very weak rock at	=
115_				111.35' - Fracture, 80 deg, rough, undulating, tight —	Ħ	105.75', voids up to 1/16" over 5-15% of rock, trace dark inclusions	D46:2 minutes
-71.9 -			>10	113.25-113.6' - Fracture zone, fragments up to 2" in diameter	H	106.0-109.3' - grayish orange, (10YR 7/4), medium to coarse grained.	R16:3 minutes
_	116.0		NR	113.25, 113.6' - Bedding plane or mechanical	出	<ul> <li>weak to strong HCl reaction,</li> </ul>	-
-			10	break (2), smooth, undulating, open (missing opposite face)	$\mathbb{H}$	extremely weak to weak (R0 to R2), poorly competent, voids to 1/8" over	-
-				113.95, 114.1' - Fractures (2), 45 deg and 35	Щ	25% of surface, fossil casts to	=
-			0	deg, tight to 1" open 114.6' - Bedding plane or mechanical break,	Щ	3/4"x1/4" over 3-12% of surface, trace dark mottling	_
_	<u>                                   </u>			smooth, undulating, tight to 1/4" open	$\boxminus$	No Recovery 109.3-111.0'	_
_	R17-NQ 5 ft	90	1	114.85' - Fracture, 80 deg, rough, undulating, dark, stain	$\mathbb{H}$	<b>Limestone</b> 111.0-115.7' - Same as 106.0-109.3'	_
_	100%	-		115.35-115.7' - Fracture zone, fragments to	Ħ	No Recovery 115.7-116.0'	<u>-</u>
_			1	2"x2" 116.6' - Fractures (2), 80 deg, smooth,	H	Limestone 116.0-119.1' - Same as 106.0-109.3'	<u>-</u>
120				undulating, intersecting, tight	H		
					1		



PROJECT NUMBER:

33884.FL BORING NUMBER:

GSC-07A SHEET 7 OF 14

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				IENT : Dietrich D-30 3/N 232, Hidd rotary, NQ tools, HW			
WATER	LEVELS : 5.0	) ft bgs	s on 4		26/200		
≥ O ⊋	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACING
뿝병은	RUI H./	(%) Q	N L D	DEDTIL TYPE OPIENTATION POLICINESS	<b>1</b> ⋈ 1	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
T X X	SOV SOV	۵	CT RFC	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	₽	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
	COF	S S	FR/ PEF	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-76.9				116.75' - Bedding plane or mechanical break,		Limestone	R17:5 minutes
-			0	<10 deg, smooth, undulating, tight		- 119.1-119.5' - yellowish gray, (5Y	-
I _	121.0			116.9' - Fracture or mechanical break, 60	ш	7/2), weak HCl reaction, weak to	
				deg, smooth, undulating, tight	П	medium strong (R2 to R3), voids to	
I -			1	118.95' - Bedding plane or fracture, 20 deg, smooth, undulating, tight		<ul> <li>1/8" over 0-20% of surface, trace cavities to 1.5'x1/4" with no infilling</li> </ul>	1
-				119.5' - Bedding plane, horizontal, smooth,	╁┷	119.5-121.0' - Same as 106.0-109.3'	-
-			1	undulating, tight	ш	- 121.0-123.55' - Same as	-
<u> </u>				121.6, 122.6, 125.5' - Bedding plane (3),	$\perp$	116.0-121.0' except increased fossil	_
	R18-NQ			horizontal, smooth, undulating, tight		casts with depth, voids up to	
-	5 ft 99%	99	0		ш	<ul> <li>1/2"x1/4" over 5-10% of rock</li> <li>123.55-123.85' - Same as</li> </ul>	1
-	3370				+	119.1-119.5' except fossil	-
_			0			<ul> <li>casts/molds to 1/2"-1/4" over 5% of</li> </ul>	_
125_					Ш	rock, trace cavities filled with clay,	
-81.9			] , ]		$\Box$	tight, many voids infilled 123.85-125.95' - moderate yellowish	R18:11 minutes
I -	126.0		1			brown, (10YR 5/4), medium to	1
-	120.0				₩	coarse grained, moderate HCl	1
-			2	126.3, 126.9, 127.1 127.65, 127.7, 127.95,	$\Box$	reaction, weak (R2), voids to 1/16"	-
I _				128.0, 128.4, 128.45, 129.65' - Bedding plane	╁┼┤	over 30-40% of rock, no visible fossils or cavities	_
			10	(10), horizontal, smooth, undulating to planar, mostly tight except at fracture zones		No Recovery 125.95-126.0'	
			10	127.65-127.7. 128.4-128.95' - Fracture zone	$\Box$	Limestone	1
-	R19-NQ			or bedding plane (2), horizontal, fragments to	$\top$	126.0-127.7' - Same as	1
-	5 ft	58	10	1/2"x1/4"		_ 123.85-123.95' except extremely weak to medium strong rock (R0 to	1
-	90%				₽	R3), mostly weak rock, moderately	-
I _			>10			fossiliferous with echinoderm molds	
130			- 10	129.65-129.95' - Bedding plane, horizontal,	$\vdash$	to 1/2"x1/4" at 126.3-127.7', trace	
-86.9			0	smooth, undulating to planar, mostly tight		fossil molds throughout entire run 127.7-128.0' - Same as 104.3-105.7'	R19:10 minutes
-			NR	except by fracture zones	ш	128.0-130.5' - Same as 126.0-127.7'	-
-	131.0		IVIX	424.05.420.4.420.2.422.0.422.05.424.2	Н	No Recovery 130.5-131.0'	07:30 water level = 3.0'
l -			1	131.05, 132.1, 132.3, 133.8, 133.95, 134.2, 134.3, 134.4, 134.65' - Bedding plane (9),		Limestone	below ground surface
l _				horizontal, smooth to rough, undulating to	Н	131.0-134.9' - Same as 126.0-130.5' - except moderately fossiliferous from	
				planar, tight except by fracture zones and	ш	132.6-133.8' with casts to 1/2"x1/4"	
_			10	where missing opposite face	Н	over 5-10% of rock, bigger voids	1
-	R20-NQ			132.05, 134.65' - Fractures (2), 60 deg, rough to smooth, undulating to planar		- and coarser texture with depth, thick	-
-	5 ft	42	10	132.5-132.65. 133.8-133.95, 134.2-134.3,	μП	rock as at 104.3-105.7' and 134.0-134.8'	1 4
_	78%			134.65-134.8' - Fracture zone (4), fragments	Ш	-	
			>10	to 1.25"x1/2"			
135				134.2' - Bedding plane, horizontal, smooth to rough, undulating to planar, tight except by	$\vdash$		1
-91.9				fracture zones where missing opposite face	ш	No Recovery 134.9-136.0'	R20:6 minutes
-			NR	· · ·	╂┼┤	_	1
_	136.0			406.0.406.75! Freehuss h - ddis	口	Limostono	-
l _			>10	136.0-136.75' - Fracture zone or bedding plane, horizontal, fragments up to 1"x2"	ш	<b>Limestone</b> - 136.0-137.0' - pale olive, (10YR 6/2),	_
			- 10	136.75, 136.95, 137.0, 137.2, 137.45. 137.55,		fine to medium grained, weak HCI	
				137.75, 138.1' - Bedding plane (8),		reaction, medium strong (R3),	1 1
-			5	horizontal, smooth, planar, tight	╂╫	- competent, trace voids to 1/16", trace	1 1
-	R21-NQ			137.3, 138.5' - Mechanical break (2)	口	cavities on interbeds to 1/2" thick with increased percentage of voids to	1 -
-	5 ft	42	1		H	- 3/16" over 30-60% infill	1
I _	82%	_			口		]
					$\vdash \vdash$		1
140			1		Ш		1
140					$\Box$		



PROJECT NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

				IENT . Diethon D-30 3/N 232, mud rotary, NQ tools, HVV			ORIENTATION: Vertical
WATER	LEVELS : 5.0	ft bgs	s on 4	/21/07 START : 4/21/2007 END : 4/	26/20	D7 LOGGER : C. Wallestad, R. McC	omb
	_			DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	5%		S	DESCRIPTION	SYMBOLIC LOG	DOOK TYPE, OOLOD	
ON PER	Z, ₹, ₹	<u></u>	쀭片	DECORN HOW	힐	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
AACH	E E E	(%) Q		DEPTH, TYPE, ORIENTATION, ROUGHNESS,	ğ	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FF 문	N S S S S S S S S S S S S S S S S S S S	g	AC R	PLANARITY, INFILLING MATERIAL AND	J. ME	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	CORE RUN, LENGTH, AND RECOVERY (%)	Ř	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Š	CHARACTERISTICS	BROFG, TEOT REGGETO, ETG.
-96.9				139.85' - Fracture, 70 deg, rough, undulating,		Limestone	R21:8 minutes
-			NR	tight	╁	<ul> <li>137.0-138.1' - grayish orange, (10YR</li> </ul>	-
I _	141.0				$\vdash$	_ 7/4), medium to coarse grained,	
					Н	weak HCl reaction, weak to medium	
_			10	141.3' - Fracture, 80 deg, smooth, undulating,		- strong (R2 to R3), voids to 3/16" over	
_				tight 141.35' - Bedding plane or mechanical break,	+	15-40% of surface, trace fossil casts	-
			>10		$\vdash$	138.1-140.1' - moderate yellowish - brown, (10YR 5/4), medium grained,	
			1/10	grinding, so not tight	1	weak HCl reaction, medium strong	
-	R22-NQ			141.75' - Fracture, 80 deg, rough, undulating,	$\pm$	(R3), competent, voids to 1/8" over	1
_	5 ft	8	10	tight and no grind mark	$\perp$	- 20-25% surface, trace fossil casts to	
	84%	-	'	141.75-143.3' - Fracture zone, associated	$\vdash$	1/2"x1/4"	
				with cavities, some staining (dark), fragments		No Recovery 140.1-141.0'	1
-			>10		╁	- Limestone	-
145			L.	143.3' - Fracture, 70 deg, smooth, undulating,	₽	141.0-141.75' - Same as	<b>_</b>
-101.9			10	open, missing opposite face 143.7' - Fracture or mechanical break, rough,	Ш	138.1-140.1' 141.75-145.2' - light olive gray with	R22:11 minutes
	146.0		NR	undulating, dark, 1/4" open		pale orange mottling, (5Y 6/1 with	1
-	146.0			144.0' - Fracture, 80 deg, rough, undulating,	₩	10YR 8/2), fine grained, strong HCl	-
			>10	open	$\perp$	reaction, medium strong (R3),	
			10	144.0-145.2' - Fracture zone, as		(possible preferential flow path,	
-				141.75-142.3'	ш	oxidation/reduction), competent,	1
_			2	146.0-146.7' - Fracture zone, fragments to 2"	+	voids to 3/16" over 10% of surface,	-
				diameter	$\vdash$	fossil casts to 1" diameter over 5%	
	R23-NQ			146.7' - 20 deg, rough, undulating, dark,		surface, dissolution cavities to 1"x2"	
-	5 ft	42	3	open, missing opposite face 146.85' - Fracture, 70 deg, rough, undulating,	$\perp$	<ul> <li>over 10% surface, 1/2" cavities without infilling, voids to 3/16" over</li> </ul>	-
_	82%			dark, tight	₽	30-40% of infilling, decreased	_
			_	146.95' - Fracture, 30 deg, smooth, planar	$\Box$	_ mottling with depth	
150			3	147.05, 148.45' - Fractures (2), 40 deg,		No Recovery 145.2-146.0'	1
-106.9			0 /	smooth, undulating -	₩	- Limestone	R23:6 minutes
- 100.0			NR	147.8, 148.15, 148.25' - Bedding plane (3),	$\perp$	_ 146.0-149.25' - dark yellowish	1125.0 111111111111111111111111111111111111
	151.0		1111	<5 deg, rough, undulating, tight to 1/4", low		orange, (10YR 6/6), fine to medium	
				angle fracture 149.35' - Bedding plane or mechanical break,	Ш	grained, moderate HCl reaction,	Note: after fractures were
-			1	49.33 - Bedding plane of mechanical break, <5 deg, rough, undulating, open, missing	+	_ medium strong (R3), competent, voids to 1/8" over 5-20% of rock,	measured, it was noticed -
I _				opposite face		- fossil casts to 1" diameter over	that the beginning of this
				149.35-149.55' - Fracture zone, fragments up		0-10% surface, infilling or	run is the end of R23,
I -			10	to 2"x1"	┰	interbedded material 1"-4" thick at	therefore subtract 0.9' from
-	D04 NO		$\vdash$	149.55' - Fracture, 40 deg, smooth, planar	╂╫	<ul><li>147.5', 148.3', 148.8', and 149.15',</li></ul>	all depths.
	R24-NQ 5 ft	62	>10	149.68' - Fracture, <5 deg, rough, undulating,	Ш	infilling consists of light olive gray (5Y	]
	100%	02	' '	open, missing opposite race		5/6), fine grained limestone, strong	j
				151.2' - Fracture, 65 deg, smooth, undulating to stepped, possible stain, tight	1-	<ul> <li>HCl reaction, trace voids to 1/16", trace cavities to 3/4" diameter, dark</li> </ul>	1
-			2	152.25' - Fracture, 20 deg, smooth,	Ш	laminations at 149.25'	1 -
155				undulating to stepped, open by fracture zone _	$\Box$	— 149.25-150.1' - Same as	
-111.9				152.45' - Fracture, 40 deg, smooth,	Н	138.1-140.1' except weak to medium	R24:6 minutes
1 -	450.0		4	undulating	$\dagger \dagger \dagger$	strong (R2 to R3), trace organics	1 1
-	156.0			152.45-153.05, 153.45-154.0' - Fracture zone		No Recovery 150.1-151.0'	1
			3	(2), fragments 2" diameter	Щ	Limestone	ı
				152.75' - Fracture, 20 deg, smooth,	H	151.0-155.5' - Same as	]
1 -				undulating to stepped, open 153.3' - Fracture, 65 deg, smooth, planar,	ш	146.0-149.25' except trace dark,	1 1
-			2	possible stain, tight	4П	wavy laminations at 154.5' 156.0-158.5' - pale yellowish brown,	] -
			-	153.45' - Fracture, 85 deg, smooth, planar,	$\vdash$	_ (10YR 6/2), fine grained, strong HCl	j
1 7	R25-NQ			open	$\vdash \vdash$	reaction, medium strong (R3), trace	1
-	5 ft	68	1	154.0' - Fracture, 75 deg, smooth, planar	ш	voids and fossil casts to 1/4"	1 -
-	98%			154.05' - Mechanical break	$\square$	_ diameter	1 _1
				154.6, 155.6, 155.8, 156.05' - Bedding plane	H		j
160			3	(4), horizontal, smooth, undulating, tight 1/4"	Ш		1
100				open	+		+ -
							j



BORING NUMBER: PROJECT NUMBER: 338884.FL

GSC-07A

SHEET 9 OF 14

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 5.0	ft bg	s on 4/	21/07 START : 4/21/2007 END : 4/	26/200	D7 LOGGER : C. Wallestad, R. McC	omb
30₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-116.9 - - -	161.0		10 (NR) 1	156.45' - 50 deg and 80 deg, smooth, planar, open, missing opposite face 156.5' - Fracture, 50 deg, smooth, undulating, tight 156.65' - Fracture, 65 deg, smooth, planar,		158.5-160.9' - interbedded rock as - 156.0-158.5' with rock as 138.1-140.0' in layers 2"-4" thick, dark, wavy laminations (1/8") at - 158.85'	R25:9 minutes - - -
- - -	R26-NQ 5 ft 70%	23	10	tight 156.7, 159.05, 159.15,159.5, 160.35, 160.5' - Bedding plane (6), horizontal, smooth, undulating, tight, some planar 157.15' - Fracture, 50 deg, smooth, undulating, tight 157.7' - Fractures (2), 70 deg and 5 deg,	- - - - - - -	No Recovery 160.9-161.0' Limestone  161.0-163.5' - Same as 138.1-140.1' except moderate yellowish brown to dark yellowish brown (10YR 4/2 to  10YR 5/4) mottling from 161.7-163.5' 163.5-164.5' - pale yellowish brown,	- - - -
- 165_ -121.9			>10 NR	smooth, undulating, open, missing opposite face 158.95' - Fracture, 65 deg, smooth, undulating, tight 160.35-160.5' - Fracture zone, fragments up		(10YR 6/2), fine to medium grained, strong HCI reaction, medium strong (R3), voids to 1/8" over 10-20% of rock, fossil cavities to 1/2"-1/4" over 5-10% of rock, possible high	R26:8 minutes -
- - -	166.0		NR >10 >10	to 1"x2" 161.85' - Fracture, 45 deg, smooth, undulating, tight 162.15' - Fracture or mechanical break, smooth, undulating, tight to 1/4" open 162.5' - Bedding plane, <10 deg, smooth, undulating, tight		percentage of dissolution cavities as evidence by fracture zone breakage pattern No Recovery 164.5-166.6' Limestone 166.6-168.7' - Same as 163.5-164.5'	- - - -
- - 170 -126.9	R27-NQ 5 ft   88%	42	>10	162.0-164.5' - Fracture zone, fractures associated with dissolution cavities 166.6-168.7' - Fracture zone, fragments to 3"x2", average 1/4" diameter, associated with possible dissolutions cavities 168.7, 169.8, 169.85, 170.2, 170.35' - Bedding plane (5), horizontal and 10 deg,		168.7-171.0' - Same as 163.5-164.5' except pale yellowish brown to dark yellowish orange, (10YR 6/6 to 10YR 6/2), fine grained, voids to 1/16" over 5-20% of surface, few cavities to	Moderate chatter at 168.0-168.5'
- -	171.0		2 5	smooth, planar, dark, tight except next to fracture zone		<ul> <li>1/8"-3/4", medium strong (R3), moderate HCl reaction 171.0-171.5' - Same as 168.7-171.0'</li> <li>171.5-172.2' - light olive gray, (5Y</li> </ul>	
_ _ _	DOO NO		10	171.55, 173.55' - Fractures (2), 60 deg, rough, undulating, tight 171.65, 171.75, 171.85, 172.3' - Bedding plane (4), horizontal, smooth, undulating, tight		<ul> <li>5/2), very fine grained, mild HCl</li> <li>reaction, very strong (R5), voids to</li> <li>3/16" over 5% of surface, weak HCl</li> <li>reaction, 1" thick, fine grained</li> </ul>	
- -	R28-NQ 5 ft 100%	55	10	173.55' - Bedding plane, 10 deg, smooth, undulating, tight 173.65' - Fracture, 45 deg, rough, undulating,		section at 171.7' 172.2-173.6' - dark yellowish orange, (10YR 6/6), fine to medium grained, mild HCI reaction, weak (R2), with	
175_ -131.9 -	176.0		10	tight 174.9-174.95' - Bedding plane, 10 deg, smooth, undulating, associated with lamination surfaces, tight 174.95-175.55' - Fracture zone, fragments to		light olive gray, moderate to coarse grained (80% orange, 20% gray, bimodal), 1/16" voids over 40%, trace larger voids/cavities (<3/16") 173.6-176.0' - pale yellowish brown	R28:7 minutes
-			10	3"x1" 175.55' - Fracture, 30 deg, smooth, planar, tight 175.7' - Fracture, 70 deg, smooth, planar,		to dark yellowish orange, (10YR 6/2 to 10YR 6/6), very fine grained, 5-10% voids (1/16"), 5% cavities from round 1/4" to 1/4"x1/2" elongate, fossiliferous, strong (R4)	
- -	R29-NQ 5 ft 100%	45	10	tight 175.85' - Fracture, 20 deg, smooth, planar, tight 176.0-176.25' - Fracture zone, fragments to 1"x2"		dropping to weak to medium (R2 to R3) below 174.8', HCl reaction similar to 163.5-164.5' 176.0-181.0' - Same as 173.6-176.0'	
180			2			except weak to medium strong (R2 to R3)	



PROJECT NUMBER: BORING NUMBER:

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# **ROCK CORE LOG**

SHEET 10 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 5.0	) ft bgs	s on 4	/21/07 START : 4/21/2007 END : 4/	26/20	07 LOGGER : C. Wallestad, R. McC	comb
				DISCONTINUITIES	(J	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	CIZE AND DEDTH OF CACING
H H H	RUN TH, / VER	(%) O	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
FF F	ORE ING	αD	RAC ER F	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
100 d	2 8 8	₩.	# #	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	, , ,
-136.9 -			10	176.25' - Fractures (2), 70 deg and 40 deg, smooth, planar, open, intersecting fractures,	Н	<u>-</u>	R29:10 minutes
_	181.0			fracture zone	Н		_
_			>10	176.55' - Bedding plane, horizontal, smooth, undulating, tight to 1/4" open	Щ	Limestone - 181.0-185.2' - pale yellowish brown	
_				176.9, 177.0' - Fractures (2), horizontal,		to dark yellowish orange, (10YR 6/2	
_			>10	smooth, undulating, fragments to 1"x1/4" 177.8' - Fracture, 75 deg, smooth, undulating,	Н	to 10YR 6/6), fine to very fine  grained, strong HCl reaction,	
_			- 10	open by fracture zone	П	medium strong to very strong (R3 to	<u> </u>
_	R30-NQ 5 ft	8	>10	177.8-178.2' - Fracture zone, fragments to 2" diameter		R5)	
_	84%	0	- 10	178.2' - Fracture, 75 deg, smooth, undulating,		_	
_			>10	dark, open 178.35' - Fracture, 55 deg, smooth, planar,	Ш	_	
185_				dark, tight	Щ		
-141.9			1	178.45, 178.7' - Fractures (2), 55 deg, smooth, undulating, tight	Ш	No Recovery 185.2-186.0'	R30:9 minutes
l _	186.0		NR	178.85-179.1' - Fracture zone, fragments to	Н	_	
l _			>10	1" diameter 179.9' - Fracture, 20 deg and 55 deg,	H	<b>Limestone</b> - 186.0-189.4' - Same as 181.0-185.2'	
_			- 10	smooth, planar, tight	Ħ	except strong to very strong (R4 to	
_			>10	180.0' - Fracture, 30 deg, smooth, planar, dark, tight		R5)	
			710	180.75-181.0' - Fracture zone, fragments to	Н		
_	R31-NQ 5 ft	0	>10	1"x2"	Ш		
l _	68%	0	- 10	(2), fragments to 2"x2", some staining	Щ		
_	1		>10	181.45' - Fracture, 20 deg, smooth, planar, open by fracture zone	Ш	L	l
190				181.65 - 10 deg and 75 deg, smooth, undulating to planar, tight —	Н	No Recovery 189.4-191.0'	Core blockage
-146.9			NR	181.85, 181.9' - Fractures (2), 75 deg,	Ħ		R31:6 minutes
_	191.0			smooth, planar, tight 184.35' - Fracture, 85 deg, smooth,	H	_	
_			10	undulating, dark, open by fracture zone	Ш	<b>Limestone</b> - 191.0-191.4' - Same as 186.0-189.4'	<u> </u>
_			10	184.65' - Bedding plane, <5 deg, smooth, undulating, tight	Н	191.4-195.9' - moderate yellowish	<u> </u>
_			>10	185.0' - Fracture, 85 deg, smooth, undulating,	Ш	brown, (10YR 5/4), fine grained, moderate HCl reaction, medium	
_			- 10	open by fracture zone 186.0-189.4' - Fracture zone, fragments to	ш	strong (R3), voids to 1/8" over	
_	R32-NQ 5 ft	65	3	5"x2", dark staining on many faces	Ш	10-25% of rock, fossil casts to 1/4" diameter over 5-10% of rock, trace	
_	98%	00		191.0-191.3' - Fracture zoné, fragments to 3" x 1" -	$\mathbb{H}$	dissolution cavities filled with lighter	]
_			0	191.3' - Fracture, 40 deg, smooth, undulating,	F	colored porous rock; 193.1-193.2' same as 191.0-191.4' and	]
195_				dark, some staining, open to fracture zone 192.2' - Fracture, 60 deg, rough, undulating, —	Ħ	181.0-189.4'	
-151 <u>.9</u> -			1	tight	H	<u>-</u>	R32: Run time not recorded
_	196.0		NR/	192.5' - Fracture, 70 deg, rough, undulating, tight	Ш	<sup>−</sup> No Recovery 195.9-196.0'	
_			8	192.5-192.8' - Fracture zone, fragments to 2" in diameter	H	_ Limestone	
_				192.8' - Bedding plane, 10 deg, rough,	H	196.0-198.9' - pale yellowish brown to grayish orange, (10YR 6/2 to	
-			>10	undulating, low angle fracture, tight 193.15' - Bedding plane, <10 deg, smooth,	Ш	_ 10YR 7/4), very fine grained, strong	]
-				planar, tight	Н	HCl reaction, strong to very strong (R4 to R5), 5-10% voids (1/16"),	]
-	R33-NQ 5 ft	60	2	193.25' - Fracture, 50 deg, smooth, planar, tight	$\Box$	trace cavities from 1/4" round to	]
-	97%			193.75' - Fracture, 30 deg, smooth, planar,	Ħ	1/4"x1/2" -	]
_			0	tight 195.7' - Bedding plane, horizontal, smooth,	H	<u>-</u>	
200				planar, tight to 1/4" open	H		
					1		



PROJECT NUMBER: BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS : 5.0	) ft bas	s on 4	/21/07 START : 4/21/2007 END : 4/2	26/20	D7 LOGGER : C. Wallestad, R. McC	Comb
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		SII	DESCRIPTION	; LOG	ROCK TYPE, COLOR,	OUZE AND DEDTH OF GARING
불병은	RUN H. A	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
FFF.	ORE NGT	σD	RAC1	PLANARITY, INFILLING MATERIAL AND	,MB(	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	SE	Ω.	R B	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SY	CHARACTERISTICS	BROFO, TEOT REGGETO, ETG.
-156.9			>10	196.45, 196.6' - Bedding plane (2),	Н	Limestone - 198.9-200.85' - pale yellowish brown	R33: Run time not recorded -
	201.0		NR.	horizontal, smooth, planar to undulating, - dark, some staining, tight to 1/8" open	Ш	to grayish orange, (10YR 6/2 to	recorded
				196.8' - Fracture, 80 deg, smooth, undulating,	Ш	10YR 7/4), fine grained, moderate	1
			1	dark, some staining, tight to 1/16" open 197.0' - Fracture, 50 deg, smooth, undulating,	H	<ul> <li>HCl reaction, strong (R4), 2" infilling of elongate cavities 1/8"-1/2" wide</li> </ul>	1
_				tight		and up to 1" long with dark gray	1 7
_			10	197.05' - Fracture, 10 deg, smooth,	Н	<ul> <li>infilling, 10% voids (1/16"), trace cavities predominantly round up to</li> </ul>	1
_	R34-NQ			197.2' - Fracture, 75 deg, rough, undulating,	Ш	1/2"	1
-	5 ft 100%	58	>10	open - 197.2-197.7' - Fracture zone, fragments	団	<ul> <li>No Recovery 200.85-201.0'</li> <li>Limestone</li> </ul>	-
_	100%			2-1/2"x 1", some dark staining	Н	201.0-201.3' - pale yellowish brown,	-
			5	198.3' - Fractures (2), 65 deg and 25 deg,	F	- (10YR 6/2), fine grained, moderate to	-
205_ -161.9				smooth, planar, tight, intersecting 200.35' - Bedding plane, horizontal, smooth,	世	strong HCl reaction, medium strong (R3), competent	R34: Run time not
-			3	planar to undulating, dark, some staining,	Н	201.3-206.0' - pale yellowish brown	recorded -
_	206.0			tight to 1/16" open 200.35-200.85' - Fracture zone, fragments	ш	to grayish orange, (10YR 6/2 to 10YR 7/4), fine grained, strong HCl	-
_			>10	1"x2"		reaction, medium strong (R3),	-
_				201.5' - Fracture, 40 deg, smooth, undulating, tight	┢	competent, voids to 3/16", trace fossil cavities, trace dark laminations	_
_			3	202.5' - Fracture, 70 deg, smooth to rough,	Ļ	to 3/16" thick, yellowish orange,	_
_				undulating, tight 202.8' - Fractures (2), 60 deg, smooth,	H	porous inclusions to 1"x1/2" over 5-10% of rock from 201.3-203.5'	_
_	R35-NQ 5 ft	48	>10	undulating, 2 parallel fractures, tight	Ш	_ 206.0-207.2' - Same as 201.0-201.3'	_
_	98%	70	- 10	202.9-203.7' - Fracture zone, fragments to	Ш	except trace laminations (3/8" thick)	
			>10	3-1/2"x1"	Н	with high void % and one cavity 1"x1/8"	
210			>10	undulating, tight	H	207.2-210.9' - moderate yellowish	1
-166.9			3	204.0, 204.5, 204.75. 205.3' - Bedding plane (4), horizontal, smooth, planar to undulating,	Ħ	<ul> <li>brown to light olive gray, (10YR 5/4 to 5Y 5/2), fine grained, moderate</li> </ul>	R35: Run time not
-	211.0			tight to 1/4" open		HCl reaction, weak to medium strong	recorded -
-			NR.	204.15' - Fracture, 20 deg, smooth, undulating, tight to 1/4" open	Ш	<ul> <li>(R2 to R3), voids to 3/16" over 30% of rock, trace fossil casts to</li> </ul>	1
_			1	205.4' - Fracture, 80 deg, smooth, undulating,	ш	1/2"x1/4", suspected dissolution in	1
-				tight - 206.0-206.3' - Fracture zone, fragments to	H	<ul> <li>fracture zones, secondary infilling with light olive gray, medium strong</li> </ul>	-
-			10	1.5"x1"	F	rock (R3) to 2"x1/2" in brown rock,	-
-	R36-NQ			206.3' - Bedding plane, horizontal, smooth,	世	- moderate HCl reaction	-
-	5 ft	52	>10	planar to stepped, open to fracture zone 207.05' - Bedding plane, horizontal, smooth,	╀┼	No Recovery 210.9-211.0' Limestone	
-	99%			planar, tight -	匚	<ul><li>211.0-211.4' - Same as 207.2-210.9'</li></ul>	-
			2	207.2' - Fracture, 70 deg, smooth, planar, tight	口	211.4-212.9' - yellowish gray to grayish orange, (5Y 7/2 to 10YR 7/4),	-
215_ -171.9				207.85' - Fracture, 40 deg, rough, undulating, —	+	— very fine grained, very strong HCl	R36: Run time not
			2	tight 208.35' - Fracture, vertical and 40 deg,	F	reaction, strong (R4), no voids, trace 1/4" cavities, HCl reaction similar to	recorded -
-	216.0		NR/	rough, undulating, open, missing opposite	岸	_ 201.0-201.3 <sup>°</sup>	-
-			0	face 208.6-208.95' - Fracture zone, fragments to	H	212.9-215.95' - pale yellowish brown to moderate yellowish brown, (10YR	-
-				1.5"x1" -	Щ	<ul> <li>6/2 to 10YR 5/4), fine grained,</li> </ul>	-
_			0	209.0' - Bedding plane, horizontal, smooth, planar, tight	口	moderate to strong HCl reaction, medium strong to strong (R3 to R4),	]
_				209.5-210.0' - Fracture zone, fragments to	$\vdash$	voids to <1/16" from 10-30%, a few	
l _	R37-NQ 5 ft	80	1	1.5"x1"	F	to many cavities up to 1/2"	
I _	98%	50		210.25' - Fracture, 30 deg, smooth, undulating, tight to 1" open	片	No Recovery 215.95-216.0'	
			3	210.6' - Fracture, 30 deg, smooth, undulating,	$\vdash$		]
220			<u>၂</u>	tight to 1/2" open	Ш		



BORING NUMBER: PROJECT NUMBER: 338884.FL

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 5.0	) ft bgs	s on 4/	21/07 START : 4/21/2007 END : 4.	/26/200	7 LOGGER : C. Wallestad, R. McC	Comb
30₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
ELO N (f	Ä, AND AY (%		'ES T	DESCRIPTION	O LC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B	E.R.L. SVEI,	%) c	JUE 1	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-176.9		_		211.8, 212.1, 212.25, 212.3, 212.4, 212.65' -		Limestone	R37: Run time not
-	004.0		2	Bedding plane (6), 25 deg, smooth, planar,	╁┼	216.0-216.5' - Same as 201.0-201.3'	recorded -
-	221.0		NR/	tight except by fracture zone 212.35' - Fracture, 25 deg, smooth, planar,	冄	and 211.4-212.9', 216.5-218.6' except trace voids to 1/16" and layers	-
-			5	open, missing opposite face	甘甘	1/4"-1/8" thick with infill materials as 216.5-218.6'	-
-				212.65-213.6' - Bedding plane, 25 deg, smooth, planar, tight except by fracture zone	₩	216.5-218.6' - yellowish gray, (5Y	-
-			>10	213.6' - Fracture, 25 deg, smooth, planar, open, missing opposite face	╁┼┼	7/2), medium to coarse grained, weak to moderate HCl reaction,	-
-	R38-NQ			214.0' - Fracture, 60 deg, smooth, undulating,	田	weak to medium strong (R2 to R3),	-
-	5 ft 68%	23	10	tight 214.6' - Fracture, 45 deg, rough, undulating,	丗	voids to 1/8" over 20-30% of rock, fossil casts to 1/2" diameter over 5%	-
-	0070		10	tight	╁╁	of rock, trace inclusions of dusky	-
225				215.6' - Fractures (2), 60 deg and 40 deg, smooth, undulating, intersecting fractures,	+	<ul> <li>yellow (5Y 7/4), low percentage of voids, infill to 4"x2"</li> </ul>	-
225_ -181.9			NR	tight to 1/8" open	冄	218.6-220.5' - Same as 201.0-201.3'	R38: Run time not
-	226.0			215.75' - Fracture, 30 deg, smooth, planar, tight to 1/8" open	Ħ	and 211.4-212.9' except trace voids to 1/16" and layers 1/4"-1/8" thick	recorded -
-	226.0			218.6' - Fractures or bedding plane (2), 35	世	with infill materials as 216.5-218.6'	-
-			10	deg and horizontal, smooth, planar to stepped, intersecting fractures, open, missing	╁┼	220.5-220.9' - yellowish gray, (5Y 7/2), medium to coarse grained,	-
-				opposite face	玾	weak to moderate HCl reaction,	-
-			10	219.0, 219.3, 219.75' - Bedding plane (3), <5 deg, rough, undulating, tight to 1/4" open	世	weak to medium strong (R2 to R3), voids to 1/8" over 20-30% of rock,	-
-	R39-NQ			219.9-220.0' - Fractures (3), 0,90,50 deg,	Ш	fossil casts to 1/2" diameter over 5%	-
-	5 ft 92%	35	4	smooth, planar, intersecting fractures, tight to 1" open, missing opposite face	╁┼	of rock, trace inclusions of dusky yellow (5Y 7/4), low percentage	-
-	3270			220.5-220.55' - Fracture zone, fragments to 1/2" diameter		voids, infill to 4"x2"  No Recovery 220.9-221.0'	Chattering (moderate) at
230			>10	221.5, 221.65, 221.9, 223.3, 223,4, 223,55,		Limestone	229.0'
-186.9			10	223.65, 223.9, 224.1' - Bedding plane (9), horizontal and 5 deg, smooth, planar, tight	╁┼	+ 221.0-221.6' - moderate yellowish brown, (10YR 5/4), fine grained,	R39: Run time not
_	231.0		NR	except by fracture zone	田	moderate to strong HCl reaction.	recorded -
	201.0			221.6, 223.35' - Fractures (2), 80 deg, smooth, undulating, tight		strong to very strong (R4 to R5), 15-20% <1/16" voids, laminar	_
-			10	221.95' - 50 deg, smooth, undulating, tight	世	appearance in both color and void	R. McComb begins logging
			40	222.55-222.9' - Fracture zone, fragments to 2"x1/2", mostly 1" diameter	Ш	percentage, transitions from above and below gradual	-
			10	223.0' - Bedding plane, 5 deg, rough,	H	221.6-221.75' - yellowish gray, (5Y	
	R40-NQ		. 40	undulating, tight to 1/2" open 223.55' - Bedding plane, horizontal and 5	Ħ	7/2), fine grained, strong HCI reaction, strong to very strong (R4 to	
	5 ft 92%	30	>10	deg, smooth, planar, tight except by fracture	$\parallel$	R5), no voids as 201-201.3' and 211.4-212.9', gradual transitions	1
			\10	zone 223.65-223.9' - Fracture zone, fragments to	出	above and below	
235			>10	2"x1/2", mostly 1" diameter 223.9' - Bedding plane, horizontal and 5 deg, –	Ж	221.75-223.7' - grayish orange to yellowish orange, (10YR 7/4 to 5Y	
-191.9			>10	smooth, planar, tight except by fracture zone	Щ	7/2), fine grained, strong HCI	R40: Run time not recorded -
	236.0		NR	224.1-224.15' - Fracture zone, fragments 1/2"x1/4"	ቯ	reaction, very weak to weak (R1 to R2), voids to 1/16" over 5-25% of	recorded
			>10	226.0-226.2, 227.65-227.8, 230.1-230.15,	団	surface, many cavities up to 3/4"	
			_10	230.4-230.45' - Fracture zone (4), fragments to 2"x1"	$\prod$	some of which infilled with 25% void rock, strong HCl reaction throughout	
			>10	226.7' - Mechanical break	耳	223.7-224.2' - Same as	
			/10	227.25' - Mechanical break 227.6, 227.65, 227.8, 228.2, 228.45, 228.5,	岸	221.6-221.75' 224.2-224.4' - Same as	
	R41-NQ 5 ft	10	>10	228.9, 229.15, 230.3' - Bedding plane (9),	罝	221.75-223.7'	
	5 π 70%	10	_10	horizontal, smooth, undulating to planar, tight except by fracture zones	H	No Recovery 224.4-226.0'	
			>10	230.3' - Bedding plane, horizontal, smooth,	丌		
240				undulating, tight except by fracture zone	Д		



PROJECT NUMBER:

33884.FL

BORING NUMBER:

GSC-07A

SHEET 13 OF 14

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing

				EINT : Dietrich D-50 5/14 252, Midd Totally, NQ tools, TW		•	ONLINIATION : Vertical
WATER	LEVELS : 5.0	tt bg	s on 4		26/20	· · · · · · · · · · · · · · · · · · ·	
≥0₽	(%)			DISCONTINUITIES	FOG	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-196.9			NR	231.1' - Fracture, <10 deg, rough, stepped,		Limestone	R41: Run time not
-	241.0		>10	open 231.4-231.7' - Fracture zone, <10 to 90 deg, rough, stepped to undulating, open 232.8' - Fracture, <10 to horizontal deg, rough, undulating, open		220.0-277.65' - yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 5-25% of rock decreasing with depth, fossil	recorded - - -
	R42-NQ 5 ft 18% 246.0	0	NR	232.9-233.4' - Fracture, 80 deg, rough, undulating, open 233.4-234.5, 234.8-235.6' - Fracture zone (2), <10 to horizontal deg, rough, stepped to undulating, open 236.0-237.0, 237.0-238.0' - Fracture zone (2), horizontal to 90 deg, rough, stepped to undulating, open 238.0-239.5' - Fracture zone, various orientations, predominantly limestone gravel 241.0-241.9' - Fracture zone, various orientations, predominantly limestone gravel		casts to 2"x 1" over 5-10% of rock Limestone 227.65-229.15' - yellowish gray, (5Y 7/2), medium grained, strong HCI reaction, extremely weak to weak (R0 to R2), trace voids to 1/16", trace cavities to 1"x2", dark laminations to 1/8" thick over 10-20% of surface Clay With Silt (CL-ML) 229.15-229.85' - medium plasticity, poorly competent, clay and silt with limestone fragments to 1/4", strong	R42: Run time not recorded -
-			>10	246.0-248.4' - Fracture zone, horizontal to 90 deg, rough, stepped to undulating, open, gravel-sized to fine cobble-sized limestone fragments		pungent sulfur or petroleum odor - (fetid) 229.85-230.6' - Same as 227.65-229.15'	-
-	-		>10	247.0' - Mechanical break	仜	<ul> <li>No Recovery 230.6-231.0'</li> <li>Limestone</li> </ul>	-
-	R43-NQ		>10	-	ш	231.0-235.2' - yellowish gray, (5Y	-
-	5 ft 48%	0		-	$\vdash$	<ul> <li>7/2), fine grained, moderate HCl reaction, very weak to weak (R1 to</li> </ul>	-
250			NR	-	Ė	R2), voids up to 1/16" over 15-20%; - <3-5% from 232.8-233.8', where limestone appears to become	4/26/07 11:35 total depth at 251.0'
-206.9 - -	251.0					conglomerate ( harder fragments within matrix), cavities up to 3/4"-1-3/16"x3/8"-3/4", penetrate into core surface, becomes thickly	R43: Run time not recorded -
-				- -		<ul> <li>laminated and less fragmented with depth with voids and cavities</li> <li>235.2-235.6' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction,</li> </ul>	- - -
-				- -		extremely weak (R0), poorly competent, somewhat friable; crumbles to silt and sand-sized material (5-10%) No Recovery 235.6-236.0'	- - -
-						Limestone 236.0-239.1' - yellowish gray, (5Y 7/2), fine grained, mild HCI reaction, very weak (R1), poorly competent to competent, somewhat friable, voids	
-						up to 1/16" over 50-60% of surface, cavities >5, 2"x2", trace fossil molds/casts 239.1-239.5' - yellowish gray, (5Y	- -
-				-		<ul> <li>7/2), very fine grained, moderate to strong HCl reaction, strong (R4), competent, voids covering 3-10% of surface</li> </ul>	_
-					1	No Recovery 239.5-241.0'	-



PROJECT NUMBER:	BORING NUMBER:					
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#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723463.8 N, 458028.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Jacksonville, FL; Driller: B. Truitt; Cathead Operator: M. Pennell

CORING METHOD AND EQUIPMENT : Dietrich D-50 S/N 232, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

				27.107 Dietricit D-50 5/10 252, Hud Totaly, 192 10015, 1197			
WATER	LEVELS : 5.0	π bgs	s on 4/		26/20		
ŞQ£	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	ANI V≺C	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A A C E	EF.	Q D (%)	Ţ.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	l S S S	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
무유실	ORE	οD	RAC ER F	PLANARITY, INFILLING MATERIAL AND	Y MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	0 H E	œ	H H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	,
						Limestone	
				_	1	- 241.0-241.9' - yellowish gray, (5Y 7/2), mild HCl reaction, very weak	_
1 1				-	1	(R1), competent, broken into	_
1 -				-	1	gravel-sized fragments, voids <1% to over 30-40%, cavities up to 1" and	-
1 -				-	1	penetrating 10% of rock	-
-				-	1	No Recovery 241.9-246.0'	_
1 -				-	1	Limestone 246.0-248.4' - yellowish gray, (5Y	_
				_	1	- 7/2), fine grained, weak to moderate	_
				_		HCl reaction, extremely weak to	_
1						weak (R0 to R2), competent, become friable at depth, voids and cavities	
1				_		over 20-30% of surface >10%,	-
				_	1	limestone at 248.0' becomes	
1 -				-	1	extremely weak, friable, trace fossil casts and molds	-
1 -				-	1	No Recovery 248.4-251.0'	_
1 -				-	1	Bottom of Boring at 251.0 ft bgs on	_
-				-	1	4/26/2007	_
-				-	4	_	_
				_	1	_	_
				_		_	_
				_			_
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1 7				-	1		_
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338884 FI	GSC-08	CHEET	1 OF 10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723365.5 N, 457759.0 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: R. Haire, T. Williams

WATER	LEVELS	: 13.8 ft b	ogs on 04	/22/07	START : 4/21/2007 END : 4/23/2007 LOGGEF	R : C	. Dougherty	
				STANDARD	SOIL DESCRIPTION	g	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LICOS CROUP CVARDOL COLOR	SYMBOLIC LOG	DEDTIL OF CASING PRILLING PATE	
ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30 Li	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
DEPT SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYME	INSTRUMENTATION	
43.2	0.0				Poorly Graded Sand With Organics (SP)		Began drilling at 16:30, 4/21/07	
-	:	1.2	SS-1	2-2-2 (4)	0.0-0.9' - medium light gray, (N6), moist, loose, fine - silica sand, organic material, trace nonplastic fines,		_	
	1.5			( ' ')	plant roots Silty Sand (SM)		-	
					\0.9-1.2' - grayish brown, (5Y 3/2), moist, loose, fine			
_					silica sand, 25% nonplastic fines, organic material	1	_	
_	-				-	4	-	
-	-				-	-	-	
-					-	1	-	
					-	1	-	
5 38.2	5.0				Poorly Graded Sand With Silt (SP-SM)	111	<del>-</del>	
-	-	0.9	SS-2	2-3-3	5.0-5.9' - grayish yellow, (5Y 8/4), wet, loose, fine silica sand, 5-10% nonplastic fines, some plant roots	間	-	
-	6.5			(6)	cinda dana, o 1070 nonpiadad inido, domo piant 100to		-	
_					_	1	_	
_					<u>-</u>	1	_	
-					-	-	-	
-					-	┨	-	
10 <u> </u>	10.0				Silty Sand (SM)		<del> </del>	
-	-	1.0	SS-3	3-4-4	10.0-11.0' - yellowish gray, (5Y 7/2), wet, loose, fine grained, fine silica sand, 25% low plastic fines	-	-	
-	11.5			(8)	grained, fine sinca sand, 25 % low plastic fines		-	
-					-	1	<u> </u>	
_					_	1	_	
-					-	1	_	
-					-	-	-	
					-	+	-	
15 <u> </u>	15.0				Silty Sand (SM)		<del>-</del>	
-	-	1.0	SS-4	3-2-3	15.0-15.95' - Sáme as 10.0-11.0'	1	-	
-	16.5			(5)		<b>T</b>	1	
-	1 3.0				-	1	-	
	]							
-						1		
-						-	-	
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20_					-	$\vdash$	-	
1								



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338884.FL	GSC-08	SHEET	2	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723365.5 N, 457759.0 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: R. Haire, T. Williams

WATER	LEVELS	: 13.8 ft k	ogs on 04	/22/07	START : 4/21/2007 END : 4/23/2007 LOG	GER	: C.	Dougherty
				STANDARD	SOIL DESCRIPTION		G	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LISCS CROLID SYMBOL COLOR		SYMBOLIC LOG	DEDTH OF CASING DOULING DATE
H BE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTATION
23.2	20.0			( )	Silty Sand (SM)		П	
		1.3	SS-5	2-2-3 (5)	20.0-21.3' - Same as 15.0-15.95'			_
	21.5			(0)		-	111.	
_								_
-						4		_
-						4		-
-						-		-
-						-		-
	05.0					-		-
25 <u> </u>	25.0				Silty Sand (SM)		П	<del></del>
-		1.0	SS-6	2-2-3	25.0-25.5' - Same as 15.0-15.95' and 20.0-21.3'  Clavey Sand (SC)	_/		-
-	26.5			(5)	25.5-26.0' - yellowish gray, (5Y 7/2), moist, loose, find	e / <b>1</b>	ZZZ:	-
-	20.0				silica sand, 30% medium plastic fines	-/ 1		-
						]		
_								_
-						4		<u>-</u>
-						-		-
-						-		-
30 <u> </u>	30.0				Silty Sand (SM)		H	Driller's Remark: Weight of hammer drove
-		1.4	SS-7	0-0-1	30.0-30.35' - dark yellowish orange, (10YR 6/6), wet, very loose, fine grained, silica sand, 30% nonplastic	. /T		sampler through top 12 inches of sample Stop work for the day, drilled to 30.0' below
-	31.5			(1)	\low plastic fines, 30.35' abrupt contact in materials,			ground surface, collected 30.0-35.35',
-	01.0				1/2" thick gray fat clay (CH) seam Clayey Sand (SC)	J/ <b>1</b>		stopped at 17:35 - Drilling resumes 08:40, 4/22/07
					30.35-31.35' - yellowish gray with medium gray mottling, (5Y 7/2 with N5), moist, very loose, fine			Water level 13' 10" below ground surface at 08:30
					grained, silica sand, 35% medium to high plastic fine	s .		- 00.30
-						_		_
-						4		-
-						-		-
35 8.2	35.0				Sandy Fat Clay (CH)		///	Slough at top of 35.0-36.5' has silty sand
-		1.5	SS-8	2-5-8	35.0-36.5' - medium gray with yellowish gray mottling (N5 with 5YR 7/2), moist, medium stiff, high plasticity	ı, − <b>t</b>		with iron oxide modules up to 1/4" (most about 1/16")
-	36.5			(13)	35% fine silica sand increasing with depth, mottling	' <sup>,</sup> -		about 1/10 )
-	55.5				increasing with depth at 35.7'	_/[		-
-						1		_
						]		
-								
-						4		-
-						-		-
40								



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723365.5 N, 457759.0 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: R. Haire, T. Williams

WATER	LEVELS	: 13.8 ft k	ogs on 04	/22/07	START: 4/21/2007 END: 4/23/2007 LOGGER: C. Dougherty	
				STANDARD	SOIL DESCRIPTION <sub>©</sub> COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	` '	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILL DRILLING FLUID LOSS, TE INSTRUMENTATIO	ING DATE
H BE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TE	STS, AND
DE PT SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DN
3.2	40.0				Silty Sand (SM)	
		1.2	SS-9	1-2-1 (3)	40.Ó-41.2' - light olive gray with medium dark gray mottling, (5Y 5/2 with N4), wet, loose, fine silica sand,	_
l _	41.5			(-)	25% nonplastic fines	_
-						-
-	-					-
-	-					-
-						-
-	-				1 1	-
45	45.0				1 1	-
-1.8	10.0				Fat Clay With Sand (CH)  45.0-45.5' - light olive gray with medium dark gray	
		1.5	SS-10	3-4-3 (7)	\ mottling, (5Y 5/2 with N4), moist, medium stiff, high \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	_
l _	46.5			. ,	\plasticity, no dilatancy, 20% fine silica sand \rightarrow \frac{1}{200} \rightarrow \frac{1}{2	_
-	-				45.5-46.4' - grayish black, (N2), moist, medium stiff,	_
-					high plasticity, slow dilatancy, interfingered with fine sand, medium gray (N5)	-
-					Silty Sand (SM) 46.4-46.5' - Same as 40.0-41.2' except light olive	-
-	-				gray, (5Y 5/2)	-
-					1 1	-
50	50.0				1 1	-
-6.8				0.00	Silty Sand (SM)  \[ \begin{align*} \text{Silty Sand (SM)} & Silty S	
_		1.5	SS-11	2-2-2 (4)	\silica sand, 25% low plastic fines \\_\frac{1}{2}	-
-	51.5				Organic Soil With Sand (OH) 50.3-51.5' - Same as 45.5-46.4'	-
-	_					_
-					1 1	-
-					1 1	-
-	-				1 1	-
					]	-
55	55.0					
-11.8 -	-			2-3-2	Organic Soil With Sand (OH) 55.0-56.5' - Same as 45.5-46.4' except 30% sand	-
-	-	1.5	SS-12	(5)	·	-
-	56.5				<del> </del>	-
-	-				1 1	-
-	-					-
-	1				1 1	-
	]				]	_
-						-
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PROJECT NUMBER:	BORING NUMBER:					
338884.FI	GSC-08	SHEET	4	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723365.5 N, 457759.0 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: R. Haire, T. Williams

WATER	LEVELS	: 13.8 ft b	ogs on 04	/22/07	START : 4/21/2007 END : 4/23/2007 LOGG	BER	: C.	Dougherty
				STANDARD	SOIL DESCRIPTION		g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	ITERVAL (ft) PENETRATION TEST RESULTS SOIL NAME, USCS GROUP SYMBOL, COLOR,					DEDTILOF CACINO DOULING DATE
H BE ACE ATIO		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		30LIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPT SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION
-16.8	60.0			25-50/5	Silt (ML)	┪	Π	
_	60.9	0.9	SS-13	(75/11")	60.0-60.9' - yellowish gray, (5Y 7/2), moist, hard, low plasticity, rapid dilatancy, moderate HCl reaction, with	1		-
-					\ carbonate, 1/2" sandy organic soil (OH) seam at top	/f		-
_					\of sample	/ 1		-
-						1		_
						]		
_								_
_						4		_
65 <u> </u>	65:P	0.0	SS-14/	50/1.5	No Docovous GE O GE 1'	_		Driller's Demarks Net aure if drilling
-21.0		/	\33-14/	(50/1.5")	No Recovery 65.0-65.1'	/ ┨		Driller's Remark: Not sure if drilling resistance, while increasing, is indicative of -
-						$\dashv$		rock. Only minor amount of sand (probably slough
-						Ⅎ		material) in sampler – We will drill to 70.0' and try another split
-						Ⅎ		spoon.
-						┪		Driller's Remark: Chatter while drilling, some - rock fragments in cuttings
-						1		
-						1		_
						1		_
70	70.0					$\perp$		
-26.8				31-41-49	Silt With Sand (ML) 70.0-71.5' - vellowish gray, (5Y 7/2), moist, hard, fine	4		_
_		1.5	SS-15	(90)	70.0-71.5 - yellowish gray, (5Y 7/2), moist, hard, fine grained, rapid dilatancy, moderate HCl reaction, 15-20% fine to coarse sand-sized, trace fine	4		_
_	71.5				gravel-sized limestone fragments, carbonate	$\mathcal{A}$	Ш	-
-						-		-
-						Ⅎ		-
-						┨		-
-						┪		-
-						1		-
75	75.0 75.2	0.0	00.10	F0/0	O:lk (BALL)		Ш	-
-31.8	, ,,,	0.2	SS-16	50/2 (50/2")	Silt (ML) 75.0-75.2' - Same as 70.0-71.5' except 20% coarse	T		
					\sand sized Begin Rock Coring at 75.0 ft bgs	/ ]		
_					See the next sheet for the rock core log	╛		_
_						1		_
_						4		_
-						4		-
-						4		-
-						$\exists$		-
						$\exists$		-
80						$\dashv$		
						- 1		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-08

SHEET 5 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723365.5 N, 457759.0 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: R. Haire, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS : 13	.8 ft b	gs on (	04/22/07 START : 4/21/2007 END : 4/	23/20	D7 LOGGER : C. Dougherty	
				DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(	ZES IT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B	GTH,	(%) Q	CTUI	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BOL	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	A Q	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-31.8	75.0					No Recovery 75.0-77.5'	13:50, 4/22/07, soil split spoon sampling is halted.
_					F		Will set casing and begin
-			NR			-	rock coring T. Williams becomes -
-	R1-HQ			-		_	operator Driller's Remark: Little
-	5 ft 30%	7	>10	77.5-78.0, 78.5-79.0, 80.2, 80.7, 80.8' -	H	Limestone	resistance to drilling until – about 77.5'
-	30%			Mechanical break (5), fragments too irregular to determine fit		<ul> <li>77.5-79.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction,</li> </ul>	about 77.5
-			2		H	weak (R2), voids abundant, only	-
			NR			<ul> <li>78.0-78.5' (75% of surface)</li> <li>No Recovery 79.0-80.0'</li> </ul>	R1: Run time not recorded
80 <u> </u>	80.0			_	F	Limentone	_
-30.8			3			<b>Limestone</b> - 80.0-81.9' - Same as 77.5-79.0	-
-				81.0, 81.3' - Joint (2), horizontal, smooth,	Н	except laminated bedding below 80.4', trace organics along bedding	-
-			4	planar, some organic material 81.3-81.9' - Fracture, vertical, rough,		<ul> <li>80.5-81.4', voids (&lt;1/16") &gt;5% of surface, along bedding plane</li> </ul>	-
	R2-HQ 5 ft	15	4	undulating, black, staining on 75% of surface 81.9, 85.5, 85.9, 86.2, 86.9, 87.3, 87.5, 88.6,	H	81.9-84.2' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction,	-
_	84%	13	-	90.3-90.9, 91.7, 92.1' - Mechanical break (11)	L	weak (R2), voids (1/16") over 75% of	_
_			0	-	H	surface (1/16" or larger) over 5%, laminated bedding at 87.2-87.5',	_
-			0		H	88.1-88.3', and 88.9-94.1'	R2: 7 minutes
85	85.0		NR		H	No Recovery 84.2-85.0'	-
-41.8	00.0		2	_	Ħ	Limestone - 85.0-90.0' - Same as 81.9-84.2'	_
				_	H	except laminated uneven bedding at	
-			2	-		85.1-85.3', and 86.2-86.9', trace large (3/8") voids, weakly competent	_
-	R3-HQ				H	interval 88.6-89.4', trace organics 87.5-88.0'	-
-	5 ft 100%	65	0	-	Ħ	_	-
-			_		Ħ	-	-
			1		F		
-			>10		£	-	R3: 6 minutes
90 <u> </u>	90.0			_	╁	90.0-92.3' - Same as 81.9-84.2'	
-			>10			<ul> <li>except from 91.0-91.8' has 75% area as very few voids, abundant voids</li> </ul>	-
-			1	-	」	<1/16" of surface, larger voids  (3/16"x 3/4" and smaller) are present	<u> </u>
-					上	91.4-92.2' (5% of area)	]
-	R4-HQ 5 ft	38	>10	92.5-93.0' - Fracture zone	卌	- Silt (ML)	-
-	66%		2	93.0, 93.15' - Mechanical break (2)	E	92.3-92.7' - light olive brown, (5Y 5/2), moderate HCl reaction,	-
-					E	<ul> <li>carbonate derived, limestone</li> <li>fragments at bottom of zone</li> </ul>	-
-			NR		H		R4: 6 minutes
95	95.0				片		
							i .



PROJECT NUMBER:

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BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723365.5 N, 457759.0 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: R. Haire, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

				IENT . CIVIE 330X 3/N 340233, ITIUU TOLAIY, FIQ 10015, FIV			ORIENTATION : Vertical
WATER	LEVELS: 13.	8 ft b	gs on (		23/200		
>	_			DISCONTINUITIES	ניז	LITHOLOGY	COMMENTS
O N (#)	. <u>2</u> %		S	DESCRIPTION	ĬŽ	ROCK TYPE, COLOR,	
E H	S E E	(9	E C	52001 Hert	익	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
F S E	RNN	ō	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	⋝	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	いゴビ	ď	ΗД		S		
-51.8				95.0-95.4' - Fracture zone	$\vdash$	Limestone	
			>10		т	<ul> <li>92.7-93.3' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction,</li> </ul>	
-				95.8, 96.1' - Mechanical break (2)	ш	very weak (R1), voids (1/16") over	-
_			2		ш	- 30% of surface	_
				96.6-97.6' - Fracture, vertical	$\Box$	No Recovery 93.3-95.0'	
	R5-HQ					Limestone	1
-	5 ft	47	3	07.6.09.0! Machanical brook (2)	ш	- 95.0-95.4' - Same as 92.7-93.3'	-
-	68%		- 10	97.6-98.0' - Mechanical break (3)	$+ \Box$	except trace organics 95.4-95.7' - yellowish gray, (5Y 7/2),	Della de Descendo le et
			>10	98.0-98.3' - Fracture zone		strong HCl reaction, very weak (R1),	Driller's Remark: lost circulation at 98.0'
					$\vdash$	voids (1/16") over 85% of surface	circulation at 56.6
1 -			NR		Ш	95.7-96.1' - Same as 92.7-93.3'	R5: 10 minutes
1 -					口	96.1-98.4' - Same as 95.4-95.7'	-
	100.0			400 0 400 01 5		except very fine grained, few voids,	
-56.8			>10	100.0-100.8' - Fracture zone, also organics		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
1 7			10	and carbonate derived silt		over 75% of surface, trace organics	1 7
				100.9-101.4' - Fracture or mechanical break,		throughout; thin zones (1-1/5") of	1 1
-			1	79 deg, rough, undulating	$\blacksquare$	carbonate-derived lean clay at	-
				101.4-101.9' - Fracture zone, some fragments have slight dark staining	Н		_
	R6-HQ	00				- Fat Clay (CH)	
	5 ft 94%	60	2	102.3, 102.8, 103.0, 103.2, 103.5' - Mechanical break (5)	Ш	100.0-100.4' - yellowish gray, (5Y	1
-	3470			Wednamed break (0)	+	7/2), thin (3/8") layered limestone at	-
_			4		ш	- 100.3', carbonate derived	-
				103.5-103.9' - Fracture, 70 deg, tight	Н	Fat Clay (CH)	_
			0		$\vdash$	100.4-100.6' - black, (N1), strong HCI reaction, carbonate derived	R6:5 minutes
105	105.0		NR		ш	Silt (ML)	1
-61.8	105.0		INK	_	+	100.6-101.0' - light olive gray, (5Y	_
-						- 5/2), strong HCl reaction, carbonate	-
					ш	_ derived	_
					Н	Limestone	
-					ш	101.0-104.2' - yellowish gray, (5Y	1
-	R7-HQ				₩	7/2), fine grained, strong HCl reaction, very weak to weak (R1 to	-
1 -	5 ft	0	NR		Ш	R2), voids (1/16") over 75% of	] -
	0%				П	surface, large voids (up to 3/8" x	]
1 7					$\vdash$	3/4") over <5%, very fossiliferous	1
-					ш	- 104.2-104.7' - Same as 101.0-104.2'	1 1
-					H	except light olive gray, (5Y 7/2), moderate HCl reaction	R7: 2 minutes
					H	- No Recovery 104.7-110.0'	
110_	110.0				Ш	•	
-66.8				_	$\vdash$	Limestone	Driller's Remark: rod drop
1 -			1	140 7 444 OL M. L		├ 110.0-111.9' - yellowish gray with	3 feet at 110.0' below -
-				110.7, 111.2' - Mechanical break (2)	Ш	medium gray mottling, (5Y 7/2 with N5), very fine grained, strong HCl	ground surface _
			3		H	reaction, very weak to weak (R1 to	] _
				111.6, 111.8' - Joint (2), horizontal, tight		R2), voids (1/16" or less) over 85%	
1 7	R8-HQ				$\mathbb{H}$	of surface, moderately fossiliferous	1
	5 ft	37			$\Box$	- (casts and molds)	-
-	38%				口	No Recovery 111.9-115.0'	] -
			NR		Н	_	]
					Ш		
1 7					$\Box$	F	R8: 1 minute
-					+	-	-
115	115.0				柙		
							1



PROJECT NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723365.5 N, 457759.0 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: R. Haire, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

ORIENTATION : Vertical

WATER	LEVELS : 13.	8 ft bo		04/22/07 START : 4/21/2007 END : 4/	23/20	007	LOGGER : C. Dougherty	
				DISCONTINUITIES		Ī	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-71.8 - -			1	115.5' - Mechanical break	- I	-	Sand (SW) 115.0-115.3' - yellowish gray and olive gray, (5Y 7/2 and 5Y 3/2), fine to coarse grained, strong HCI	- -
- - - -	R9-HQ 5 ft 20%	10	NR				reaction Limestone 115.3-116.0' - Same as 110.0-111.9' except yellowish gray, (5Y 7/2) No Recovery 116.0-120.0'	- - - R9: 3 minutes
120_	120.0			_		L		
-76.8 - -			N/A		- - -	-	Sandy Silt (ML) 120.0-121.5" - yellowish gray, (5Y 7/2), soft, strong HCl reaction, weakly competent limestone	Driller's Remark: 120.0- 125.0' rod dropped entire – interval
-			N/A		Ш	+	fragments at bottom of section,	-
- - -	R10-HQ 5 ft 1 30%	0	NR				Carbonate derived No Recovery 121.5-125.0'	- - - R10: Runtime not recorded
					廿	╁		- R TO. Runtime not recorded
125 -81.8 -	125.0		>10	125.0-128.3, 125.8-126.2' - Fractures or mechanical break (2), no visible orientation		<u> </u>	Limestone 125.0-126.4' - Same as 110.0-111.9' except poorly competent, trace black,	-
-			>10	126.4, 126.6, 127.5' - Mechanical break (3)		<u> </u>	staining throughout core 126.4-128.5' - light gray, (N7), strong HCl reaction, very weak (R1), voids	- -
-	R11-HQ 5 ft 70%	52	1			<u> </u>	(1/16") over 70% of surface, cavities (up to 3/4"x1-9/16") over 5% of surface, very fossiliferous (mold and	- - -
-			0		$\pm$	╁	casts) No Recovery 128.5-130.0'	-
130	130.0		NR			<u> </u>		R11: 4 minutes
-86.8 -			>10	_		ŀ	Sandy Silt (ML) 130.0-131.3' - grayish orange to light olive gray, (10YR 7/6 to 5Y 5/2),	
-	R12-HQ		>10	131.7-132.0' - Fracture zone		<b> </b>	strong HCI reaction, fine sand-sized particles about 25%, carbonate derived, abrupt transition to 131.3-132.2'	- -
-	5 ft 92%	8	>10	132.4-134.6' - Fracture zone, most are probable mechanical breaks		<u> </u>	Limestone 131.3-132.2' - very pale orange to light olive gray, (10YR 8/2 to 5Y 5/2),	- -
-			>10 >10		Ħ	}	fine grained, strong HCl reaction, medium strong (R3), laminated bedding (<1/16" thick) below 131.8',	R12: 7 minutes
135	135.0		NR		Ħ	1	transitions gradually to 132.2-134.6'	_



PROJECT NUMBER:

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BORING NUMBER:

GSC-08 SHEET 8 OF 10

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723365.5 N, 457759.0 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: R. Haire, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

WATER	LEVELS : 13	.8 ft b	gs on (	04/22/07 START : 4/21/2007 END : 4.	<u>/23/</u> 20	07 LOGGER : C. Dougherty	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-91.8 -	-		>10	135.0-136.0' - Fracture zone, fragments	Ħ	Limestone - 132.3-134.6' - very pale orange to	-
-			3	136.3, 136.6, 136.95' - Mechanical break (3)	Ħ	yellowish gray, (10YR 8/2 to 5Y 7/2), fine grained, extremely weak to very weak (R0 to R1), trace intervals of laminated bedding	
-	R13-HQ 5 ft 82%	47	1	137.4-137.7' - Fracture zone or mechanical break		No Recovery 134.6-135.0'  Limestone 135.0-137.9' - Same as 132.3-134.6'	
-			>10	138.2-138.5' - Fractures (5), smooth, planar, fractures along bedding planes, probably mechanical breaks	Ħ	except zone of light olive gray (5YR 5/2) 137.9-139.1' - light olive gray, (5YR 5/2), fine grained, strong HCl	R13: 5 minutes
140_	140.0		NR	_	臣	reaction, weak (R2), voids (1/16")     over 60% of surface, oriented along     bedding planes (laminated bedding).	
-96.8 - -			2	140.4' - Mechanical break 140.6-140.9' - Fracture zone, no visible		zone of medium gray (N5) limestone, medium strong (R3) from 137.9-138.1'	
-			>10	orientation 142.2-142.3' - Fracture zone or mechanical break, rough, undulating	#	No Recovery 139.1-140.0' Limestone 140.0-143.0' - Same as 137.9-139.1'	
-	R14-HQ 5 ft 66%	13	>10			_ laminated bedding only in top foot of core	
-			NR			143.0-143.3' - Same as 140-143.0' - except mottled medium gray (n5), with few voids No Recovery 143.3-145.0'	R14: 5 minutes
145_	145.0			_	ᅪ		
-101.8 - -			0			Limestone 145.0-147.8' - medium light gray to yellowish gray, (N6 to 5Y 7/2), fine	
_			>10	146.1-146.5' - Fracture zone 146.6' - Mechanical break		grained, strong to moderate HCI reaction, strong to very strong (R4 to R5), voids over 25% of surface, one	
-	R15-HQ 5 ft 86%	68	3	147' - Fracture, horizontal, rough, undulating, black staining on surface 147.3' - Mechanical break		cavity (3/4"x3/4") passes through - core at 145.5' - 147.8-149.3' - yellowish gray, (5Y	
-			2	147.6' - Fracture, horizontal, smooth, undulating, black staining on surfaces 148.3' - Mechanical break	#	7/2), very fine grained, strong to very strong HCl reaction, very strong (R5), laminated to thinly bedded, voids	
_			) (0		井	(1/16") occur in some bedding planes	R15: 9 minutes
150 -106.8 -	150.0		NR 1	150.0-150.3' - Fracture zone		but not others, overall in about 20%  of surface  No Recovery 149.3-150.0'	
_			4	151.1, 151.2' - Fractures (2), horizontal,	片	Limestone  150.0-150.4' - dusky yellow, (5Y 6/4), fine to medium grained, moderately	
_ _	R16-HQ 5 ft	45	3	rough, undulating, probable mechanical breaks but surfaces don't match 151.3, 151.6' - Mechanical break (2)	H	HCl reaction, very weak (R1), voids (1/16") over 90% of surface 150.4-151.0' - very pale orange to	
-	76%	70	1	152.1' - Fracture, horizontal, smooth, undulating, probable mechanical breaks, but surfaces don't match	揖	yellowish brown, (10YR 8/2 to 10YR 6/2), fine grained, strong HCl reaction, very strong (R5)	-
_			NR	152.2-153.8' - Fracture, horizontal, smooth, undulating, black, probable mechanical breaks, but surfaces don't match		151.0-152.2' - Same as 150-150.4' 152.2-153.8' - Same as 150.4-151' except with slight increase in voids	R16: Runtime not recorded
155	155.0				H	- (1/16") over 5-10% (mostly in browner rock)	
I							



PROJECT NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723365.5 N, 457759.0 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: R. Haire, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing

WATER	LEVELS: 13	.8 ft b	gs on (	04/22/07 START : 4/21/2007 END : 4	1/23/20	07 LOGGER : C. Dougherty	
≥∩≎	. (9			DISCONTINUITIES	قِ ا	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES T	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ACE	E T. H.	(%) <sub>Q</sub>	17.00 10.00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	O Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ORE	Ø	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	, I MB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	OIR	22	표집		, S		
-111.8 -			3	155.1' - Fracture or mechanical break 155.1-155.7' - Fracture, vertical, rough,	#	No Recovery 153.8-155.0' - Limestone	-
_				undulating, some staining on surface	$\perp$	_ 155.0-156.1' - Same as 152.2-153.8'	_
_			2	155.7' - Fracture, 5 deg, smooth, planar, coating of olive gray (5Y 3/2), carbonate	$\perp$	156.1-157.3' - yellowish gray, (5Y 7/2), fine grained, strong HCl	_
_				derived silt and fine sand on faces	$\perp$	reaction, weak (R2), voids (1/16")	_
_	R17-HQ 5 ft	47	2	156.1' - Fracture, horizontal, smooth, undulating, probable mechanical break, but	$\perp$	over 35% of surface 157.3-158.9' - yellowish gray, (5Y	_
_	78%			faces don't match up	$\perp$	_ 7/2), fine grained, strong HCI	<u> </u>
_			1	156.8' - Mechanical break 156.8-157.2' - Fracture, 70 deg, rough,		reaction, very weak (R1), voids (1/16") of over 85% of surface, large	_
1 _			NR	planar, some black staining on surface	片	L (3/8") voids over 5%	
I _				157.2' - Mechanical break	$\mathbf{F}$	No Recovery 158.9-160.0'	R17: 9 minutes
160_	160.0			157.5' - Fracture or mechanical break, rough, undulating	┸	L	
-116.8			>10	160.0-160.8' - Fracture zone		Limestone - 160.0-160.4' - Same as 157.3-158.9'	
1					$\bot$	160.4-160.7' - vellowish gray. (5Y	
1 -					茾	7/2), fine grained, strong HCl reaction, very weak (R1), voids	]
1 -					ľ	(1/16") over 80% of surface	]
1	R18-HC				H	No Récovery 160.8-165.0'	_
	5 ft 16%	0	NR		H	[	_
					Т	Ţ	_
1 -					Ъ	<u>[</u>	-
1 -					1	ſ	R18: 2 minutes
165	165.0				H	[	_
-121.8				_	1	Limestone	_
1 -			2	165.4-165.7' - Fracture or mechanical break, 60 deg, rough, undulating		- 165.0-168.7' - light olive gray, (5YR 5/2), fine grained, strong HCl	_
1 -				165.9' - Fracture, 30 deg, rough, undulating	$\mathbf{H}$	reaction, weak (R2), trace laminated	_
1 -			4	166.1-166.5' - Fracture or mechanical break, 70 deg, rough, undulating	$\blacksquare$	bedding 166.7-167.5', voids (1/16"-3/16") over 5% of surface	
-	R19-HQ			166.6, 166.8' - Mechanical break (2)	$\perp$	165.0-166.0'	-
-	5 ft 78%	47	>10	167.3-167.8' - Fracture zone	+	Ť	
1 -			.40	168.2' - Fracture, horizontal, smooth, planar,	F	<u> </u>	· -
1 -			>10	iron oxide	Ħ	168.7-168.9' - moderate olive brown,	-
1 -			ND	168.3-168.9' - Fracture zone, probable mechanical break, but faces don't match up		(5Y 4/4), fine to medium grained,	R19: 8 minutes
170	170.0		NR	medianical break, but laces don't match up	$\mathbf{H}$	moderate to strong HCl reaction, very weak to weak (R1 to R2), voids	-
-126.8	170.0			170.0-175.0' - Fracture, vertical, rough,	扛	(1/16") over 80% of surface.	_
-			2	undulating, black, staining on 10% of surface 170.2' - Fracture, horizontal, probable	世	No Recovery 168.9-170.0	-
-				mechanical break but faces don't match up	+	Limestone 170.0-170.3' - Same as 168.7-168.9'	-
-			>10	171.4-171.9' - Mechanical break	F	170.3-174.7' - light olive gray, (5YR	-
-	R20-HC			171.9-172.9' - Fracture, vertical, rough,	廿	5/2), fine grained, strong HCl reaction, weak (R2)	-
-	5 ft 94%	52	4	undulating 172.2' - Mechanical break	+	<u>†</u>	-
-	9470			172.2-172.6' - Fractures or mechanical break	$\blacksquare$	ł	-
-			4	(2), rough, undulating 172.6' - Mechanical break	世	<u>}</u>	-
-				173' - Fracture, horizontal, smooth, planar,	$\pm$	<del>}</del>	R20: 9 minutes
			1	slight black staining on surfaces	+	<del> </del>	-
175	175.0		NR		+	No Recovery 174.7-175.0'	



PROJECT NUMBER:

33884.FL BORING NUMBER:

GSC-08 SHEET 10 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723365.5 N, 457759.0 E (NAD83)

ELEVATION: 43.2 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: R. Haire, T. Williams

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS : 13	.8 ft b	gs on (	04/22/07 START : 4/21/2007 END : 4/2	23/20	07 LOGGER : C. Dougherty	
<b>≷</b> ∩ລ	(%)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	T.H.	(%) Q	TUR 100-	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Š	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
E REI	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-131.8	075	ď	шФ	173.4-173.9' - Fractures or mechanical break	S	Limestone	
-101.0			2	(2), horizontal and 50 deg, rough, undulating -	Ė	- 175.0-180.0' - Same as 170.3-174.7'	_
_				173.9, 174.3' - Fractures (2), horizontal, smooth, undulating, some dark staining on	L	except laminated bedding from 175.9-176.5' and 179.3-180.0'	-
_			2	surface -	$\vdash$	175.9-170.5 and 179.5-160.0	-
_	DO4 LIO			175.6' - Fracture, horizontal, smooth, planar, dark staining on surfaces		_	-
-	R21-HQ 5 ft	55	1	176.4' - Fracture, horizontal, smooth, planar,	ഥ	<u>-</u>	_
_	100%			coating of carbonate derived silt 177' - Fracture or mechanical break,	Н	-	_
_			>10	horizontal, rough, undulating	F	<u>-</u>	_
_				177.0-177.3' - Fracture or mechanical break, 70 deg, rough, undulating		-	
1 -			>10	178.3' - Fracture, horizontal, smooth,	片	-	R21: 9 minutes
180 -136.8	180.0			undulating, coating of carbonate derived silt  178.5-179.5' - Fracture zone		190 0 191 91 duple velle (5V 0/4)	
-130.8			2	179.6, 179.7' - Mechanical break (2)	Ш	180.0-181.8' - dusky yellow, (5Y 6/4), moderate HCl reaction, weak (R2),	-
_				180.3' - Fracture, horizontal, rough, undulating, dark staining	ш	voids over 75% of surface. Below	-
1 -			>10	180.9' - Mechanical break	世	180.6', limestone appears to interfinger (possible infilling) and	-
_	Day HO			182.0-182.4' - Fracture or mechanical break,	Н	then laminated bedding as in 175.0-180.0'	-
_	R22-HQ 5 ft	57	2	vertical, rough, undulating -	F	- 181.8-185.0' - Same as 175-180.0'	-
_	100%			182.5' - Fracture, horizontal, smooth, undulating, coating of carbonate derived silt,	F	except zone from 182.5-183.5' with voids (3/8"x3/4") <5% of surface	Plugging borehole on
_			3	trace of dark staining	L	-	4/24/07 -
-				183.7, 183.9, 184.0' - Fracture or mechanical	H	_	R22: 6 minutes
-			2	break (3), 45 deg, rough, undulating 184' - Fracture or mechanical break, 45 deg,	Н	-	K22. 0 minutes
185_ -141.8	185.0			rough, undulating  ↑ 184.4' - Fracture, horizontal, smooth,	F	Bottom of Boring at 185.0 ft bgs on	
-				undulating, dark staining on 70% of surface	ł	- 4/23/2007	-
-				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ł	_	-
-				vertical, rough, undulating	ł	-	-
_				-	ł	-	-
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-08A	SHEET	1	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723362.2 N, 457763.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WATER					START : 6/14/2007	END : 6/16/2007		: J. \$	Schaeffer, D. Thomas
						SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS				SYMBOLIC LOG	
		RECOVE	ERY (ft)	TEOTINEOUETO	SOIL NAMI	E, USCS GROUP SYMBOL, CONTENT, RELATIVE DEN	, COLOR,	ЭГІС	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH EVA			#TYPE	6"-6"-6"	CONSISTEN	CY, SOIL STRUCTURE, MIN	NERALOGY	'MB(	INSTRUMENTATION
SUI			<u>-</u>	(N)				SΥ	
43.1							_		Blind drill to 25.0' to begin split spoon sampling -
							_		Boring GSC-08A is 5.0' offset from GSC-08 toward E-6 (southeast)
-							_		toward E-6 (southeast)
_							-		-
-							_		-
-							_		-
-							_		-
-							_		-
							-		-
5 38.1									Cuttings from 5.0-10.0' appear to be fine
-							-		sands -
-							-		-
-							-		-
-							-		-
-							-		-
_							_		-
_							_		_
_							_		_
_							_		_
10									
33.1							_		Cuttings from 10.0-15.0' appear to be sand and clayey sands -
_							_		and diayey durido
_							_		
							_		
							_		
-							_		1
-							_		
-							_		1
15							_		1
28.1									Drilling mud is Quick Gel bentonite
-							_		
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20									
L	l	1							



PROJECT NUMBER:	BORING NUMBER:			
338884 FI	GSC-08A	CHEET	2 OF 8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723362.2 N, 457763.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WATER	LEVELS	: 4.9 ft bo	s on 6/17	7/07	START : 6/14/2007 END : 6/16/2007 LOGGE	R : J	. Schaeffer, D. Thomas
				STANDARD	SOIL DESCRIPTION	_ u	COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME LIGGS OPOUR SYMPOL COLOR	070	DEDTIL OF CACING DOULING DATE
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	30LI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	INSTRUMENTATION
23.1				(14)		╫	
-	-					1	-
-						1	
						]	
-						]	
_						1	_
_						1	-
-	-					4	-
-						-	-
25 <u> </u>	25.0				Silty Sand (SM)	+	<del>-</del>
-	-	1.1	SS-1	2-2-2	25.0-26.1' - light brownish gray, (5YR 6/1), wet, very loose, nonplastic, no HCl reaction, very fine to fine	11	-
-	26.5			(4)	grained sand, 25% fines, silica sand	╬	-
-	20.0					1	-
						]	
_							_
_						1	_
-	-					-	-
-	-					+	-
30 <u> </u>	30.0				Silty Sand (SM)	+	<del>-</del>
-	-	1.1	SS-2	5-5-6	30.0-31.1' - Same as 25.0-26.1' except medium dense	1	-
-	31.5			(11)		711	-
						1	
_						1	_
-	-					-	-
-	-					+	-
	35.0					+	-
35 8.1	35.0				Fat Clay With Sand (CH)		<del>-</del>
1 -	1	1.5	SS-3	2-3-5 (8)	35.0-36.5' - brownish gray and olive gray, (5YR 4/1 and 5Y 4/1), mottled, moist, no HCl reaction, medium		<sup>-</sup>
1 -	36.5			(0)	stiff, high plasticity, 20% very fine to fine silica sand		
1 -							
-	]					1	_
-						1	-
-						4	-
-	-					+	-
40	-					+	-
40_					-	+	
1							



PROJECT NUMBER: BORING NUMBER: 338884.FL GSC-08A

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723362.2 N, 457763.1 E (NAD83)

DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard ELEVATION: 43.1 ft (NAVD88)

SHEET 3 OF 8

DRILLIN	G METH	DD AND	EQUIPM	ENT : CME 75 S/I	N 252437, mud rotary, auto hammer, NW rods, 4-7/8" tri-cone bit ORIENTATION : Vertical
WATER	LEVELS	: 4.9 ft bo	s on 6/17	7/07 S	TART : 6/14/2007 END : 6/16/2007 LOGGER : J. Schaeffer, D. Thomas
30₽				STANDARD PENETRATION	SOIL DESCRIPTION COMMENTS
ELO ON (1	SAMPLE	INTERVA		TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH B FACI		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, WIINERALOGY
3.1	40.0			0.5.0	Fat Clay With Sand (CH) 40.0-40.8' - pale yellowish brown, (10YR 6/2), mottled,
_		1.5	SS-4	3-5-2 (7)	noist, no HCl reaction, medium stiff, 15-25% fine Resume drilling 07:45 on 6/15/07; advance
_	41.5				\sand, 10-15% coarse rounded sand, medium \square HW casing from 15' to 40'
_					Fat Clay With Sand (CH)
_					\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
-					41.0-41.05' - medium dark gray, (N4), medium stiff, high plasticity, 10% fine sand, 20% coarse sand-sized
-					gray material (possible pyrite), angular
-					Silty Sand (SM) 41.05-41.5' - moderate yellowish brown, (10YR 5/4),
45	45.0				mottled, wet, loose, very fine to fine grained, no HCl
-1.9					reaction, 25% nonplastic fines  Clayey Sand (SC)
		1.5	SS-5	0-2-4 (6)	↑ 45.0-45.5' - pale yellowish brown, (10YR 6/2), wet, very loose, no HCl reaction, mottled and streaked with
l _	46.5			(-,	∖medium dark gray (N4), very fine to fine grained sand, /
_					35-40% high plastic fines Silty Sand (SM)
_					\ \delta \. \del
-					fines
-					Clayey Sand (SC) 46.1-46.5' - Same as 45.0-45.5' except no HCl
-					reaction, more clay with depth, with organic soil and   -
50 50	50.0				1/2" peat lenses 46.3' and 1.5" thick lens of organic soil/peat from 46.4-46.5', organic soil/peat is grayish
-6.9	30.0				black (N2), moist, medium stiff, very high plasticity, no dilatancy, appears to be pyrite grains to sand-sized
-		1.4	SS-6	6-5-7 (12)	Clayey Sand (SC)
	51.5			(12)	50.0-51.4' - similar to 40.5-45.5' and 46.1-46.6', — moderate yellowish brown with gray streaking, (10YR
					\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
_					high plastic fines, 1/4" thick organic soil/peat (OH/PT)
_					lens at 50.0', same as 46.1-46.5'
-					11
-					4 1
					4 1
55 <u> </u>	55.0				Silty Sand With Organic Soil/ Peat Lenses (SM)  Driller's Remark: 25% circulation loss
-		1.5	SS-7	0-1-1	55.0-56.5' - pale yellowish brown to moderate - starting at 55.0' - yellowish brown, (10YR 6/2 to 10YR 5/4), mottled,
-	56.5			(2)	wet, very loose, no HCl reaction, very fine to fine
_	50.5				grained sand, 20-25% low plastic fines, organic - soil/peat (OH/PT) lenses at 55.0-55.1', 56.1-56.15',
					and 56.3-56.5'; same as 50.0-51.4'
					1   1
					] [
_					] ]
-					11
60					



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-08A	SHEET	4	OF	8

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723362.2 N, 457763.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

DRILLIN	GIVIETH	OD AND	EQUIPM	ENT : CIVIE 75 S/	N 252437, mud rotary,	auto hammer, NW rods, 4-	1/8" tri-cone bit		ORIENTATION : Vertical
WATER	LEVELS	: 4.9 ft b	gs on 6/1	7/07	START : 6/14/2007	END: 6/16/2007	LOGGE	R : J.	Schaeffer, D. Thomas
				STANDARD		SOIL DESCRIPTION		(D	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	AL (ft)	PENETRATION TEST RESULTS				SYMBOLIC LOG	
		RECOVE	. ,	IESI KESULIS	SOIL NAME,	USCS GROUP SYMBOL,	COLOR,	Ξ	DEPTH OF CASING, DRILLING RATE,
T H A A		I KLOOVI			MOISTURE C	ONTENT, RELATIVE DEN	ISITY OR	ВВ	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
F. C. F.			#TYPE	6"-6"-6" (N)	CONSISTENC	, SOIL STRUCTURE, WIIN	ERALOGI	S N	INSTRUMENTATION
-16.9	60.0			(1.1)	Silty To Clayey S	Sand (SM-SC)		111	
-	55.5	1.5	000	4-4-5	60.0-61.5' - Same	e as 55.0-56.5' except no		-[	-
-		1.5	SS-8	(9)		lded peat/organic soil (Pinses 1/16"-2" thick, most		4111	-
_	61.5					arance in organic soil/pe		4111	_
l _						peat and 40% silty to cla		╛	_
-	1							1	<u> </u>
_	1							1	-
-	-							┨	-
-								4	Driller's Remark: Harder at 64.0'
-								4	Dillici 3 Netilaik. Haidel at 04.0
65	65.0							<u> </u>	Driller's Remark: Circulation loss continues
-21.9					Silt (ML)	wish gray, (5Y 8/1), mois	t medium	##	at 25% Driller's Remark: Material from 64.0-70.0' -
	]	1.3	SS-9	7-4-9 (13)		apid dilatancy, moderate		間	drills hard and soft in lavers
-	66.5			(13)	reaction, carbona	ite material, organic soil/	peat lenses	111	Will switch to rock coring after 70.0' sample
-	00.5					n, 1/4" thick, laminated, s	ame as	1	-
-	-				above	and With Silt To Silty S	and	┨	-
-					(SP-SM)	and with one to only o	and	-	-
-					65.2-66.25' - pale	yellowish brown, (10YR	6/2), wet,	4	-
_					medium dense, n	o HCl reaction, fine sand	d, 10-15%	_	_
					Silt (ML)				
-	1				66.25-66.3' - San	ne as 65.0-65.2'	1	1	<u> </u>
70	70.0							1	-
-26.9	70.0			39-50/4	Silty Sand (SM)			111	-
-	70.8	0.8	SS-10	(89/10")	70.0-70.8' - palé	yellowish brown, (10YR 6		-	-
_	7 0.0			, ,		to moderate HCl reaction 6 nonplastic fines, trace			-
_						stone, carbonate materia		4	_
_					(e	·			_
					Begin Rock Corir	ng at 72.0 ft bgs			
-	1				See the next she	et for the rock core log		1	<u> </u>
-	1							1	-
-	1							┨	-
-	1							-	-
-								4	-
75							_	4	
-31.9								_	_
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90	1							1	-
80							<del>-</del>	+	



FRACTURES PER FOOT

N/A

4

>10

3

1

1

83 0

1

NR

2

2

1

1

NR

3

1

1

NR

58 2

78.3-78.5'

fracture

healed

of clay to silt

underlying rock

cavities

end of core

RQD(%)

15 1

WATER LEVELS: 4.9 ft bgs on 6/17/07

CORE RUN, LENGTH, AND RECOVERY (%)

R1-HQ

5 ft

100%

R2-HQ

5 ft 84%

R3-HQ

5 ft | 67 | 1

R4-HQ

5 ft

80%

DEPTH BELOW SURFACE AND ELEVATION (ft)

-31.9

80

-36.9

85

-41.<del>9</del>

90

-46.<del>9</del>

77.0

82 0

87.0

92.0

PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-08A

SHEET 5 OF 8

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723362.2 N, 457763.1 E (NAD83)

START: 6/14/2007

**DESCRIPTION** 

DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND

THICKNESS, SURFACE STAINING, AND TIGHTNESS

73.2, 73.5, 74.0' - Fractures (3), rough,

undulating, between two horizontal fractures

75.0-76.1' - multiple Fractures to fragments,

many vertical fractures with 3-4" fragments,

banded at top by 40 deg rough, undulating fracture, at bottom by 20 deg rough

undulating fracture
76.9-77.0' - Fractures or mechanical break

77.15' - Fracture, smooth, planar, horizontal

78.4' - Fracture, 20 deg, rough, undulating, at

80.6' - Fracture, 20 deg, rough, some crumble, open, gray infill at cavity included in

Fractures (7), open to tight, mostly horizontal

83.9-84.5' - softer, bounded by fractures, infill

85.3' - Fracture, 45 deg, rough, undulating,

87.1' - Fracture, open, horizontal fracture to

87.5' - Fracture, 45 deg, roughly stepped, also a discontinuity, overlying and underlying rock are different, though fracture mostly in

87.8' - Fracture, open, horizontal, roughly stepped, several small 1/2" fragments 88.6' - similar to fracture at 87.8', but in

different material with additional voids and

89.9, 90.0' - Mechanical break (2), 0-20 deg

90.9' - Fracture, 50 deg, rough, undulating, at

small fragments with two 1" fragments

healed or mechanical break

82.1, 82.8, 83.3, 83.9, 84.3, 86.1, 86.6' -

fractures, substantial voids, gray infill at

fracture, possible drilling mud, possibly

zone of increased voids and cavities from

74.4' - Fracture, 75 deg, rough, undulating

73.3' - Fractures (2), 50 deg, rough,

DISCONTINUITIES

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

END: 6/16/2007

9

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, HW casing

undulating, horizontal

ORIENTATION: Vertical LOGGER: J. Schaeffer, D. Thomas LITHOLOGY COMMENTS ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS Poorly Graded Sand With Silt (SP-SM) 72.0-72.7' - yellowish gray, (5Y 7/2), wet, mild HCl reaction, 85% fine grained subangular silica sand, 5% coarse silica sand, 10% silt-sized carbonate material Organic Soil (OL) Box break at 74.5', just 72.7-72.8' - olive black, (5Y 2/1), below or at near-vertical medium stiff, medium plasticity, mild fracture HCI reaction Limestone R1:6 minutes 72.8-77.0' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), fine grained, extremely weak (R)0 from 72.8-74.2', weak to medium strong elsewhere (R2 to R3) 77.0-81.2' - light olive gray, (5Y 5/2), fine grained, mild to moderate HCI Driller's Remark: Drilling reaction, weak (R2), with trace soft intermittently at about darker gray banding variably throughout, several 1/2"-1" cavities. voids (1/16 to 1/8") varying 5-20% coverage, increased voids and cavities near 77.7, 78.4, 80.4, 80.7, 81.2', subtle organic band at 81.25' with slight darker color shift and less voids below (20% above, 5% below), R2:5 minutes gray cavity infill at 80.4' with strong HCÍ reaction No Recovery 81.2-82.0' Limestone 82.0-86.8' - Same as 77.0-81.2' except weak to medium strong (R2 to R3), increased voids to 25% and numerous cavities and dissolutions up to 2" with gray infill at 82.0-83.3 and 85.8-86.8, very weak (R1) at 83.9-84.5', some cavities reach almost across the core R3:4 minutes No Recovery 86.8-87.0' Limestone 87.0-87.3' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, weak (R2), 40% small (1/16") voids, several cavities up to 1/2" (fossils), friable 87.3-88.25' - pale yellowish brown, (10YR 6/2), fine grained, mild to moderate HCI reaction, weak (R2), <3% voids, several fossil cavities up to 1/2", less friable than above R4:5 minutes



BORING NUMBER: PROJECT NUMBER: 338884.FL

GSC-08A

SHEET 6 OF 8

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723362.2 N, 457763.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, HW casing

WATER	LEVELS : 4.9	ft bg	s on 6	/17/07 START : 6/14/2007 END : 6/	16/20	07 LOGGER : J. Schaeffer, D. Thom	nas
≥∩≘	(9)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR LEN REC	a a	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS 92.0-92.4' - Fracture zone, angular 1/4"-1" of	SYM	AND ROCK MASS CHARACTERISTICS Limestone	DROPS, TEST RESULTS, ETC.  Driller's Remark: May have
-			<10	over and underlying material 92.5' - Fracture, rough, undulating, horizontal, end of rock fragments	Ė	- 88.25-91.0' - Same as 87.0-87.3' except with 20% voids and increased elongate fossils, transition from	lost circulation at 91'
-			3	92.6' - Fracture, 70 deg, rough, undulating, - joins with horizontal fracture at 92.5'		<ul> <li>overlying paler-colored material, material has several filled voids, thin</li> </ul>	-
95	R5-HQ 5 ft 54%	13	2	93.0' - rough, planar, discontinuity, horizontal, open, faces do not match 93.15' - Fracture, 45 deg, planar, healed,	E	(up to 1/4" thick) layers of silt-sized material at 89.5' with moderate HCl reaction, organics at 90.8'	-
-51.9 - - -	97.0		NR	<1/16" relief 93.9, 94.0' - Fracture (2), rough, undulating, horizontal, more open at 93.9', healed at 94.0' 94.4, 94.5' - Fracture (2), 0-30 deg, rough, stepped, open, fragments		No Recovery 91.0-92.0'  Limestone 92.0-92.4' - Same as 87.3-88.25' except pale yellowish brown and moderate yellowish brown, (10YR 6/2 and 10YR 5/4), up to 2" angular color	R5:5 minutes  Driller's Remark: No circulation while drilling 92-
-			1	97.6' - discontinuity between overlying unconsolidated material and underlying rock, some rock fragments above		blocks co-mingled 92.4-92.7' - Same as 87.3-88.25' 92.7-93.0' - Same as 87.0-87.3' 93.0-93.3' - Same as 87.3-88.25' except transitions to material below	97'
-	R6-HQ 5 ft	73	1	98.3' - Fracture, 40 deg, rough, undulating, healed - -		at 70 degree angle 93.3-94.1' - Same as 87.0-87.3' 94.1-94.6' - Same as 87.3-88.25' except becoming softer with depth,	-
-56.9 	100%		2	99.8, 100.2' - Fractures (2), 10 deg, rough, undulating, transition from overlying limestone with voids to yellow limestone at		very weak rock (R1) in the last 2" of interval, fractures at 94.5' and 94.6' in very weak rock	_
-	400.0		2	99.8', then to weaker limestone, both have silt-sized infill 100.7' - Fracture, 70 deg, rough, undulating	Ė	94.6-94.7' - unconsolidated pale     yellowish brown and black organics     No Recovery 94.7-97.0'	R6:5 minutes
-	102.0		NR <10	101.3' - Mechanical break, or fracture, healed 101.7' - Fracture, 40 deg, rough, undulating, fragments	Ħ	Limestone 97.0-97.6' - dark yellowish gray grading to pale greenish yellow with  □	Core loss interpreted to be at beginning of core run based on drill time
-			<10	102.6-103.4' - fragments, unconsolidated		depth, (10YR 4/2 to 10YR 8/2), fine grained, strong HCl reaction, angular blocks of color	-
105	R7-HQ 5 ft 88%	60	0	104.3, 107.35' - Fractures (2), horizontal, infill, upper fracture is open, lower is tight and		97.6-99.8' - pale yellowish brown, (10YR 6/2), strong HCl reaction, weak (R2), fossil cavities up to 1/4" and up to 1" elongated	
-61.9 -			0	similar in color, calcareous infill, silt-sized 104.5' - horizontal discontinuity 105.2' - 10 deg, healed or mechanical break	H	99.8-100.7' - pale greenish yellow, (10Y 8/2), strong HCl reaction, medium strong to very weak (R3 to	-
-	107.0		0	-	Ħ	R1), <5% voids on core surface, friable   100.7-102.0' - Same as 97.6-99.8'	R7:4 minutes –
-			2	-	Ė	except with fragments at the last 0.2' of interval No Recovery 102.0-102.6'	_
-			1	108.1' - Fracture, tight, horizontal or mechanical break -	Ħ	Silt (ML)  102.6-103.6' - light olive gray, (5Y  5/2), very soft, fine grained,	-
110_ -66.9	R8-HQ 5 ft 100%	90	0	- -		moderate HCl reaction, carbonate derived 103.6-104.0' - Same as 102.6-103.6'	
-00.9			2	110.1' - Fracture, 10 deg, mechanical, healed 110.9, 111.0' - Fractures (2), horizontal, very	F	except with a 1" thick fragment of limestone (yellowish gray (5Y 7/2), very weak [R1], 10% coverage of	- D0:4 minutes
_	112.0		1	similar to fractures and zone at 107.3', calcareous infill, open	Ē	1/16" voids)	R8:4 minutes



PROJECT NUMBER: BORING NUMBER: 338884.FL GSC-08A

**ROCK CORE LOG** 

SHEET 7 OF 8

ORIENTATION: Vertical

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723362.2 N, 457763.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, HW casing

WATER LEVELS: 4.9 ft bgs on 6/17/07				17/07 START : 6/14/2007 END :	6/16/2	20	07 LOGGER: J. Schaeffer, D. Thom			
≥□≎	(%			DISCONTINUITIES		ر و	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	S	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
-	0.7%	IL.	1	112.15' - Fracture, 10 deg, open, unconsolidated sediments beneath	-	,	Limestone 104.0-107.0' - pale greenish yellow,	_		
-115 -71.9 -	R9-HQ 5 ft 6%	0	NR				(10Y 8/2), fine grained, strong HCI reaction, weak (R2), 20% voids, fossils 1/4"-1" size  Limestone 107.0-112.0' - Same as 104.0-107.0' except extremely weak (R0) at fracture zones (intervals 1"-2" in length) at 107.3' and 110.0', very consistent color, texture and voids  Limestone 112.0-112.15' - Same as 107.0-112.0' Silt (ML)	Driller's Remark: 3.5' of void at 113.5-117'		
120 -76.9	R10-HQ 5 ft 0%	0	NR		-		Sitt (ML) 112.15-112.3' - pale greenish yellow, (10Y 8/2), fine grained, strong HCl reaction, carbonate derived No Recovery 112.3-123.5'	Driller's Remark: Rods lowered without drilling to - 120' (about 3 feet)		
- - -	122.0				_		- - -	R10:1 minute Driller's Remark: Felt like drilling sediment at 120- 122'; drilling fluid was coffee color		
-			NR				-	Driller's Remark: Rods pushed 122.0-123.0', definitely sediments, not a		
_	D44.110		N/A	123.5' - interpret no recovery before due to R10, drill rates, and competent material at			Elastic Silt (MH) - 123.5-126.0' - yellowish gray to light	void; then troubles getting core barrel to set		
125_ -81.9	R11-HQ 5 ft 58%	0	N/A	126.0'	4		olive gray, (5Y 7/2 to 5Y 5/2), wet, soft to medium stiff, low plasticity, no to slow dilatancy, strong HCl			
-01.9			N/A		-		reaction, trace organics (1/16" fragments and one 1" chunk)	-		
-			4	126.0, 126.15, 126.2' - Fractures (3), smooth,	#		Limestone	R11:3 minutes		
	127.0		NR	planar, horizontal, numerous other planes every 1/16"	<b>‡</b>		- 126.0-126.4' - light olive gray, (5Y 5/2), fine to very fine grained, strong	Last foot had slow and fast sections (likely 6" of void)		
_			5	126.3' - Fractures, above horizontal fractures and with partial vertical fractures 126.4' - no recovery			(R4), horizontal laminations and fractures, no voids No Recovery 126.4-127.0'	-		
-			>10	127.1' - Fracture, overlying large fragment to horizontal fracture, with debris 127.1-128.6' - Fracture, vertical, open to tight,	E		Limestone 127.0-131.8' - yellowish gray to grayish orange, (5Y 7/2 to 10YR 7/4),	-		
130	R12-HQ 5 ft 96%	45	0	gray discolorations along fracture faces, other vertical and horizontal fractures starting from main fracture, but most are short and	1	L	fine grained, strong HCl reaction, weak (R2), 3% coverage of voids (1/16"), several fossils (casts/molds	]		
-86.9 -	22.9		1	tight 128.6-128.9' - fragment, terminated below by a 60 deg rough and undulating fracture at	1		[elongate (1/4"-1/2")]), shallow (1/4") - cavities though very intact looking, at 131.4-131.8' increased voids and	_		
_	132.0		3	129.0' 130.1' - Fracture, rough, undulating, horizontal, open			cavities, infilled elongate cavities with hard gray limestone	R12:4 minutes		
	132.0									



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-08A

SHEET 8 OF 8

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723362.2 N, 457763.1 E (NAD83)

ELEVATION: 43.1 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 4.9	ft bgs	s on 6/	/17/07 START : 6/14/2007 END : 6	/16/20	07 LOGGER: J. Schaeffer, D. Thom	nas
30,⊋	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH B FACE	E RU STH, OVE	R Q D (%)	FOCT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SURI ELE	COR	RQI	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	-		NR/	131.5' - Fracture, 70 deg, with several 1-2"	ti	No Recovery 131.8-132.0'	
-			3	fragments mostly elongate, all roughly stepped to undulating, possible multiple	╁	- <b>Limestone</b> 132.0-132.1' - Same as 127.0-131.8'	-
-				vertical fractures	+	except pale greenish yellow, (10Y	-
-			>10	132.3-132.4' - Fractures, horizontal, smooth, planar, Fragments bounded by smooth,	Ħ	- 8/2) 132.1-132.55' - Same as 126.0-126.4	-
_	R13-HQ			planar fractures, flat 1/4" triangles	Ħ	except moderate to strong HCI	-
135	5 ft 76%	22	5	133.4-133.95' - Fracture, 40 deg, rough, stepped, leading into fragments with angular	T	<ul> <li>reaction, strong (R4), horizontal bedding planes with breaks and</li> </ul>	-
-91.9			4	block with vertical and horizontal fractures, transition between limestone within	L	fragments broken along horizontal planes	
			-	fragments	$\mathbb{H}$	132.55-133.75' - Same as	
			NR	133.95, 134.05, 134.4, 134.6, 134.9' - Fractures (5), horizontal to 10 deg fractures	F	132.0-132.1' except strong HCl reaction, weak to very weak (R2 to	R13:5 minutes
_	137.0			along visible horizontal laminations/planes,		R1), weakening and becoming friable	Total depth of boring 137.0'
_				roughly to smoothly planar 135.1' - Fracture, 70 deg, rough, undulating	1	with depth 133.75-135.8' - Same as	Hole open to 97.0' after removing casing
_				135.25, 135.2, 135.5' - Fractures (3), 20 deg, rough, undulating, tight, open	1	132.1-132.55' except weak to medium strong (R2 to R3),	_
_				\135.65' - Fracture, sealed fracture plane with	1	banding/layering with grayer and	Water level at 4.9' below ground surface at 08:50 on
-				light gray silt-sized infill 1/4" thick	4	greener bands No Recovery 135.8-137.0'	6/17/07
-					4	<ul> <li>Bottom of Boring at 137.0 ft bgs on</li> </ul>	_
_				-	_	6/16/2007	
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-09	SHEET	1	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723154.0 N, 457653.4 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

						CND : 4/7/200				ORIENTATION : VEItical
	LEVELS	. ∠.∪ π Ϧϳ	gs on 04/0		START : 4/5/2007	END : 4/7/200		JGGER		McComb COMMENTS
<b>≥</b> 9€	SAMDIF	INTERVA	I (ft)	STANDARD PENETRATION TEST RESULTS		GOIL DEGGIAII TIO			99.	COMMENTO
ON O	SAMPLE		. ,	TEST RESULTS	SOIL NAM	ME, USCS GROUP SYN	MBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
FAC		RECOVE		011 011 011		E CONTENT, RELATIV NCY, SOIL STRUCTURI		,	/BOI	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTEN	NOT, SOIL STRUCTUR	L, WIINLIVALOG	'	SYN	INSTRUMENTATION
41.3	0.0				- Topsoil				11,	
-	1	1.2	SS-1	1-2-3 (5)	15-20% fine s	ish black, (N2), moist, ilica sand	, soπ, organics,	/1		_
-	1.5			(3)	Poorly Grade	d Sand With Organic	s (SP)		1. (1)	_
-					0.2-1.2' - medi	ium gray to medium d ose, fine silica sand, tr	lark gray, (N5 to	P / <b>1</b>		<del>-</del>
-					fines, 10-15%	fine organics, increas	sing to 20% at 0	).9' / 🕇		Water level at 2.0'
-								_ 1		<del>-</del>
-	-							-		<del>-</del>
-	-							-		<del>-</del>
-	1							-		<del>-</del>
5	5.0							-		-
36.3	0.0				Silty Sand (SI	M)			П	
-	-	1.1	SS-2	1-2-2	5.0-6.1' - light	olive brown to modera 4/1), wet, very loose, v	ate olive brown, very fine silica	, –		-
-	6.5			(4)	sand, 15-20%	nonplastic fines, trace	e organics	/‡	H	-
-	0.0				1			-		_
-	-							-		-
-	-							-		-
-	-							-		Driller's Remark: Light chattering at 8.0'
-	-							-		-
-	1							1		-
10	10.0							1		_
31.3	10.0			40.00.50/0	Silt (ML)			. 1	Ш	
-		0.8	SS-3	10-22-50/3 (72/9")	10.0-10.75' - g	grayish yellow to mode , wet, hard, nonplastic	erate yellow, (5Y . rapid dilatancv	, †	Ш	_
-	11.3			( /	\ moderate HCl	reaction, carbonate n	naterial, 3/8" thi	ick / T		_
-					fine silica sand	sand (SC) at top of sad, medium plastic fine	ampie, bluisn gr :s	ray, / -		_
-						,				_
-								1		_
-								1		_
1 -	1							1		-
1 -	1							1		Driller's Remark: Very slow rate of
15	15.0							1		penetration (27 minutes)
26.3		0.8	SS-4	42-50/3	Silt (ML)	10.0.10.75			Ш	
_	15.8	0.0		(92/9")	yellow, (5Y 8/4	ame as 10.0-10.75' ex 4), mild HCl reaction	cept grayisn	1	Ш	_
_										_
_								1		_
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PROJECT NUMBER:	BORING NUMBER:
338884.FL	GSC-09

SHEET 2 OF 10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723154.0 N, 457653.4 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER LEVELS : 2.0 ft bgs on 04/05/07 START : 4/5/2007 END : 4/7/2007 LOGGER : R. McComb					
STAN				STANDARD	SOIL DESCRIPTION O COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE INTERVAL (ft)			PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
H BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OF DRILLING FASTING FOR THE PROPERTY OF THE
DEP. SURI ELE			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
21.3	20.0	1.0	SS-5	32-50	Silt (ML) 20.0-21.0' - Same as 15.0-15.8' except 5-10% very
	21.0	1.0	00-0	(82")	fine to fine sand
	-				
	-				-
	-				-
	1				<del>-</del>
	1				1
	]				]
25_	25.0				
16.3	-	1.2	SS-6	45-47-50/4	Silt (ML) 25.0-26.2' - Same as 20.0-21.0' except very fine to
	26.3	1.2	33-0	(97/10")	medium sand-sized material increasing to 15% with depth
	-				-
	-				<b>-</b>
	1				1
	]				]
					<b> </b>
	_				Driller's Remark: Hard drilling at 29.0'
30 <u></u> 11.3	30.0	0.2	SS-7	50/4	Silt And Limestone Fragments (ML)
	-		001	(50/4")	30.0-30.2' - Same as 25.0-26.2' except 30% coarse sand-sized limestone fragments, dark gray (N3)
	-				\fragments (non-calcareous), with black calcareous
	1				material on some surfaces — — — —
	]				]
	-				4
	-				-
25	-				-
35_ 6.3	35.0				Sandy Silt (ML)
		1.4	SS-8	42-27-40 (67)	35.0-36.4' - light olive gray, (5Y 5/2), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 30-35%
	36.5			(51)	fine to coarse sand-sized limestone fragments, trace fine gravel-sized limestone fragments, carbonate
	_				material
	-				
	-				
	-				
	1				1
40_	1				



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-09

SHEET 3 OF 10

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723154.0 N, 457653.4 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DRILLING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8" tri-cone bit ORIENTATION: Vertical

WATER				05/07	START : 4/5/2007 END : 4/7/2007 LOGGEI	R : F	R. McComb			
				STANDARD	SOIL DESCRIPTION		COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME TIGOS OBSTILL STATES OST CE	Ĭ	DEPTH OF CASING, DRILLING RATE,			
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	NT, RELATIVE DENSITY OR 📗 🔲 📗 DRILLIN				
DEPT SURF SLEV,			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	N × W	INSTRUMENTATION			
1.3	40.0			(,	Silty Sand (SM)	П	Driller's Remark: Lost circulation at 40.0'			
-		1.5	SS-9	1-2-4 (6)	40.0-41.5' - light olive gray to olive gray, (5Y 5/2 to 5Y 3/2), wet, loose, mild HCl reaction, fine to coarse		<b>∤</b>			
-	41.5			(6)	sand-sized limestone fragments, 30% low plastic fines, 5% fine gravel-sized limestone fragments,	1	1			
					carbonate materials	T	1			
						]				
-						┨	_			
_						-	-			
-						┨	-			
- 45	44.7	0.0	00.40	F0/4	Limenton Francisco And Oile	1	-			
45 <u> </u> -3.7		0.3	SS-10	50/4 (50/4") /	Limestone Fragments And Silt  45.0-45.3' - yellowish gray, (5Y 7/2), mild HCl	Ħ	Split spoon sample SS-10 actually advanced			
-					reaction, carbonate material, 80% fine to coarse gravel-sized limestone fragments; 20% Silt (ML): wet,	1	1			
-					nonplastic, rapid dilatancy Begin Rock Coring at 45.0 ft bgs	1	1			
					See the next sheet for the rock core log	]	]			
_							_			
_						1	-			
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50 -8.7					_	1				
-						1	1			
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-13.7					_	1	1			
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-09

SHEET 4 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723154.0 N, 457653.4 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

≥0≎							
	<u> </u>			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI ATIC	JE PER PER PER PER PER PER PER PER PER PE	(%) О	F.S.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
E SE	SECORE	RO	'RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	15.0	ш.	шш		0)	No Recovery 45.0-49.0'	Began rock coring at 45.0'
" -  '	10.0			-	1	-	- began rock coming at 45.0
_				-	1	-	-
				-	1	_	_
_	D4 HO		NR	-	1 1	_	-
	R1-HQ 5 ft	0		-	1	_	-
-	20%			-	1	_	-
				-	1	_	_
-				49.0-50.0' - Fracture zone, various	H	Limestone	R1:4 minutes
-			>10	orientations	H	<ul> <li>49.0-49.5' - yellowish gray, (5Y 7/2),</li> </ul>	- 1\1.4 IIIIIIu(65
50 <u>5</u> -8.7	50.0			49.5' - 0-60 deg, smooth, planar, open 50.0' - Fracture, 60 deg, rough, undulating	Ш	fine grained, mild HCl reaction, extremely weak (R0), friable, voids	 Driller's Remark: Last 1.0'
",			0	50.0 - Fracture, oo deg, rough, undulating	₽	over 50-60% of surface	is harder than above; no
-			-	51.05' - Fracture, 60 deg, rough, stepped,	Ш	49.5-50.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 8/2), very	circulation _
-			2	tight	口	<ul> <li>fine grained, mild to moderate HCl</li> </ul>	-
_	R2-HQ			51.75' - Fracture, horizontal, rough,	$\Box$	reaction, very weak (R1), presence of micro fractures inclined 60-70 deg.	Driller's Remark: Very soft
-	5 ft	35		undulating, open	Н	<ul> <li>voids over less than 1% of surface,</li> </ul>	from 52.0-55.0'
-	43%		NR	-	H	3/4"-1-3/16" size cavities over less than 9% of the surface	-
-				-	H	<ul> <li>50.0-51.75' - yellowish gray, (5Y 7/2),</li> </ul>	_
-				-	H	very fine grained, moderate HCl reaction, very weak to weak (R1 to	R2:7 minutes
			2	FACI Franking of day assembly and daking	Н	<ul> <li>R2), voids over 1-3% of surface,</li> </ul>	-
55 <u>5</u> -13.7	55.0			54.6' - Fracture, <5 deg, rough, undulating,	Н	3/4"-3/16" cavities over up to 10% of the surface, trace fossil cast and	
			>1	54.8' - Fracture, 80 deg, rough, stepped	H	molds, trace cavity infilling No Recovery 51.75-54.6'	-
-				-	ш	Limestone	-
-				-	Н	_ 54.6-55.0' - Same as 50.0-51.75' except yellowish gray, (5Y 7/2), voids	-
-	R3-HQ			56.8' - Fracture, 60 deg, rough, stepped to		over less than 3% of the surface, few	-
-	5 ft	14		undulating, open	H	_ cavities <b>Limestone</b>	-
-	26%		NR	-	H	55.0-56.3' - dusky yellow to light olive	-
-				-	Ш	gray, (5Y 6/4 to 5Ý 6/1), fine grained, mild HCl reaction, very weak (R1),	-
-				-	H	voids over 15-30% of surface,	R3:7 minutes
				-	囯	cavities are 3/4"-1-3/16" long and 1/8"-3/16" wide, fossiliferous	-
60 <u>6</u> -18.7	60.0		>10	_	団	— (molds/casts)	-
-				-	Ш	No Recovery 56.3-60.0' Limestone	-
-				-	H	<ul> <li>60.0-60.4' - light olive brown, (5Y 5/6), fine grained, mild HCl reaction,</li> </ul>	Driller's Remark: Very soft
-				-	Ħ	extremely weak (R0), voids over 25%	from 61.0-64.0'
-	R4-HQ		NR	-	Ħ	<ul> <li>of the surface, fossiliferous (possible shark tooth), molds and casts</li> </ul>	
-	5 ft 30%	20	`\	-	Ш	No Recovery 60.4-64.0'	
-	30 /0			-	${\mathbb H}$	-	
-				-	H	-	-
			-	64.0' - Fracture, 0-50 deg, rough, stepped	囯	<del>-</del>	R4:7 minutes
65 6	55.0		1	-	Ш	-	-
03 0	,				$\Box$		
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PROJECT NUMBER: BORING NUMBER: 338884.FL

**GSC-09** 

SHEET 5 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723154.0 N, 457653.4 E (NAD83)

DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams ELEVATION: 41.3 ft (NAVD88)

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ tools, HW casing ORIENTATION: Vertical WATER LEVELS: 2.0 ft bgs on 04/05/07 START: 4/5/2007 LOGGER: R. McComb END: 4/7/2007

300	<u> </u>			DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-23.7 -	OIR	<u>~</u>	N/A	-	S	Limestone 64.0-65.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine	-
-	R5-HQ		N/A	-		grained, mild HCl reaction, extremely weak (R0), voids up to 1/16" over 40-50% of surface, 3/4"-1-3/16" size cavities over 1-3% of surface.	- Driller's Remark: Hard spot
-	5 ft 100%	16	N/A	- -		fossiliferous (molds/casts)  Carbonate Sand (SP)  65.0-69.2' - moderately yellowish brown to pale yellowish brown.	at 67.0' -
-			N/A >1	- - 69.2' - Fracture, 40 deg, smooth, stepped to undulating, black coating over 5% of the joint		(10YR 5/4 to 10YR 6/2), wet, loose, fine to very fine grained, moderate HCI reaction	- R5:4 minutes
70 <u> </u>	70.0		0	surface -	H	Limestone 69.2-70.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, mild HCl reaction, very weak	-
-			>3	71.1' - Fracture, 0-60 deg, rough, stepped, open 71.35' - Fracture, horizontal, rough, stepped,		(R1), voids up to 1/16" over 15-20% of the surface, 1/16-1/8" size voids becoming more abundant with depth,	
- -	R6-HQ 5 ft 36%	22	NR	open 71.4' - Fracture, horizontal, smooth, stepped, open -		slightly fossiliferous (molds and casts) 70.0-71.55' - Same as 69.2-70.0' except mottled No Recovery 71.55-74.75'	Driller's Remark: No return of circulation continues – ever since 45.0'
75	75.0		>1	- 74.75' - Fracture, 50 deg, rough, undulating,		_ Limestone	R6:9 minutes
-33.7 - - - -	R7-HQ 5 ft	36	NR	open		74.75-75.0' - moderate yellow, (5Y 7/6), fine to very fine grained, moderate HCl reaction, extremely weak (R0), friable, slightly fossiliferous (molds/casts), mottled with very fine grained lamination with fewer voids, few cavities up to 3/16"x3/16"	- - - -
-	44%		1		Ħ	No Recovery 75.0-77.8' Limestone 77.8-79.0' - yellowish gray, (5Y 7/2), mottled, very fine grained, mild HCl	Driller's Remark: Recovery – from bottom (77.8-80.0')
80_ -38.7	80.0		2	78.8' - Fracture, 30 deg, smooth, undulating, black stain over 5% of surface 79.0' - Fracture, <5 deg, smooth, undulating, tight		reaction, weak (R2), voids up to 1/16" over 15-25% of surface, few cavities up to 3/16", slightly fossiliferous (casts and molds), up to	R7:8 minutes
-50.7			3	79.35' - Fracture, <5-30 deg, rough, stepped to undulating, open 80.4' - Fracture, <5 deg and 50 deg, rough, undulating, open	Ħ	1" cavities with secondary infill of limestone with voids (1/16") over 40% of surface	-
-	R8-HQ 5 ft	38	4	80.8' - Fracture, <5 deg, smooth, undulating, open 81.0' - Fracture, 0-70 deg, rough, stepped, open	Ė	<ul> <li>79.0-80.0' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, weak (R2), voids up to</li> <li>1/16" over 3% of surface,</li> </ul>	
- -	68%		NR	81.1' - Fracture, 40 deg, rough, undulating, open 82.05' - Fracture, <5-50 deg, rough, stepped to undulating, open 82.3' - Fracture, 40 deg, rough, stepped,		interspaced with cavities with 2% infill of very weak lamination with voids over 50-60%, trace fossil (mold/cast)	- - R8:Runtime not recorded
85	85.0			open	F		
					1		



PROJECT NUMBER: BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723154.0 N, 457653.4 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	ft bgs	s on 04	4/05/07 START : 4/5/2007 END : 4/	7/2007	LOGGER : R. McComb	
≥0₽	_ @			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-43.7 - - - - - -	- - - - R9-HQ		NR	82.5' - Fracture, 40 deg, rough, stepped, open 82.6' - Fracture, <5-70 deg, rough, stepped, open		Limestone  - 80.0-83.4' - yellowish gray, (5Y 7/2), fine to very fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), voids (up to 1/16") over 15-25% of surface, many 3/16"x1/16" cavities, few cavities up to 3/8"x3/16", fossiliferous (molds/casts)  No Recovery 83.4-90.0'	On 4/5/07 at 85.0', advanced HW casing to 86.0' from 45.0' due to sand interval above a slipping casing, very soft at 86.0', able to hammer casing easily several feet, able to get the circulation back Lost circulation at 87.0'
90 -48.7	90.0		0	90' - limestone fragments of 6" core		Limestone Fragments	Driller's Remark: Pulled core barrel but no
- - - -	R10-HQ 5 ft 20%	0	NR			<ul> <li>90.0-90.5' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, very weak (R1), voids over 50-60% of surface with cavities up to 3/16", fossiliferous (infill/casts)         No Recovery 90.5-93.0'     </li> </ul>	recovery, tagged the bottom of borehole at 90.0', suspect 85.0-90.0' is sand 90.0-90.5' firm drilling 90.5-93.0' very soft 93.0-94.0' some what harder 94.0-95.0 very soft
_			0		ш	Limestone	1
-			NR			<ul> <li>93.0-93.5' - yellowish gray, (5Y 7/2),</li> <li>very fine grained, mild HCl reaction,</li> <li>weak (R2), voids over up to 5-10% of</li> <li>surface, carbonate black coating on</li> </ul>	R10: No run time recorded
95 <u>-</u> -53.7	95.0			_	ш	5% of the surface, cavities No Recovery 93.5-95.0'	Drillerle Demonto LIM
-53.7 - - - -	R11-HQ 5 ft 52%	36	0 NR			Limestone     95.0-95.8' - light olive gray, (5Y 5/2),     very fine grained, mild HCl reaction,     weak (R2), voids over 13% of     surface, with sand and silt-sized     carbonate grains, clayey     No Recovery 95.8-98.2'	Driller's Remark: HW casing continue to drop, advancing HW to 95.0'  SPT from 95.0-96.5 to determine the lithology, recorded 0.8' limestone gravel; will switch back to HW coring (17, 50/3',
_					Ш	Limestone	67/9")
100	100.0		1	98.5' - Fracture, 60 deg, rough, stepped, tight, inclined 99.0' - Fracture, horizontal, rough, undulating, tight		98.2-100.0' - yellowish gray, (5Y 7/2), fine to very fine grained, mild HCI reaction, weak (R2), up to 1/16" voids over 15-20% of surface, few	R11:8 minutes -
-58. <del>7</del>			>10	100.0-100.3' - Fracture zone, <5 deg and 60 deg, rough, undulating, open 100.75-101.0' - Fracture zone, <5 deg, rough, undulating, open		cavities up to 9/16"x3/4"on the surface, mottled, interspaced with very fine grained limestone with fewer voids, fossiliferous (molds and casts)	-
				101.3-101.55' - Fracture zone, <5-60 deg, rough, stepped, open		100.0-101.4' - moderate olive brown, (5Y 4/4), fine grained, mild HCl	] 1
-	R12-HQ 5 ft 58%	20	>10	101.9' - Fracture, horizontal, smooth, planar, clay infilling 102.05' - Fracture, <5 deg, rough, undulating, open		reaction, weak (R2), gravel-sized fragments, voids up to 1/8" over 25-30% of surface, few 3/8"x3/16" cavities on surface, fossiliferous	- - -
105	105.0		NR	102.5-102.9' - Fracture zone, 0-90 deg, rough, stepped, open		(molds/casts)	R12:11 minutes -
105	105.0		$\vdash$		$\Box$	_ !!	



PROJECT NUMBER: BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723154.0 N, 457653.4 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	ft bgs	on 04	1/05/07 START : 4/5/2007 END : 4/	7/200	7 LOGGER : R. McComb	
>00	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
TH B	RE RU IGTH SOVE	(%) Q	CTU	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	/BOL	WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUF	COF LEN REC	a Q	FRA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-63.7			10	105.0-106.0' - Fracture zone, 0 to inclined 60-70 deg, rough, undulating, open	Н	Limestone - 101.4-101.9' - pale greenish yellow to	
			10	oo-70 deg, rough, undulating, open	F	yellowish gray, (10Y 8/2 to 5Y 7/2),	
_			10	106 45' Fracture <5 dog rough undulating	Щ	very fine grained, moderate to strong  HCl reaction, weak to medium strong	_
_	R13-HQ		>10	106.45' - Fracture, <5 deg, rough, undulating, open	ш	_ (R2 to R3)	-
-	5 ft	23	>10	106.45-107.4' - Fracture zone, rough, stepped, various orientations, open	口	Clay With Limestone (CL) 101.9-102.2' - black to very dark	-
-	48%				世	gray, (N1 to N3), wet, soft, black carbonate coated gravel-sized	-
-			NR	-	口	fragments	-
_				-	ш	Limestone 102.2-102.9' - Same as 100.0-101.4'	R13:7 minutes
110	110.0			<del>-</del>	Ш	except yellowish gray to grayish yellow, (5Y 7/2 to 5Y 8/4), cavity	1
-68.7	-		4		Ш	infilling up to 1-3/16"-3/4", fossil molds and casts	]
_			7	open 110.5' - Fracture, 0-90 deg, rough, stepped,	Н	No Recovery 102.9-105.0'	
-			>10	open	H	Limestone 105.0-107.4' - yellowish gray, (5Y	
_	R14-HQ			110.6' - Fracture, 70 deg, rough, stepped 110.8' - Fracture, <5 deg, rough, stepped,	$\vdash$	_ 7/2), fine to very fine grained, mild to moderate HCl reaction, weak to	-
-	5 ft	23	1	joins with fracture at 110.6' 111.3- 111.9' - Fracture zone, various	$\mathbf{H}$	<ul> <li>medium strong (R2 to R3), fossil</li> </ul>	-
-	49%			orientations	H	molds and casts, voids up to 1/16" over 30-40% of surface, few cavities	-
-			NR	112.45' - Fracture zone, 0-90 deg, rough, stepped, open	Ħ	<ul> <li>up to 3/16"x3/16" exist on the rock surface</li> </ul>	
-				-	Ħ	No Recovery 107.4-110.0'	R14:4 minutes
115	115.0			-	Ħ	<ul> <li>Limestone 110.0-112.45' - Same as</li> </ul>	1
-73.7			3		Ħ	105.0-107.4' - <b>No Recovery 112.45-115.0'</b>	
			J	to stepped, open 115.4' - Fracture, 40 deg, rough, undulating,	Ħ	Limestone	
_				tight	H	115.0-116.0' - yellowish gray, (5Y – 7/2), fine grained, mild HCl reaction,	_
_	R15-HQ			115.85' - Fracture, 50 deg, rough, undulating, open	Ħ	very weak (R1), friable, voids up to 1/16" over 25-30% of surface,	-
_	5 ft	7		-	H	3/4"-1-3/16" cavities rarely exist on surface, rare fossiliferous	-
-	20%		NR	-	H	(casts/molds)	-
-				-	H	No Recovery 116.0-125.0'	-
-				·	Ш	_	R15:4 minutes
	120.0	_		-	$\parallel$		1
-78.7					Н		]
_				_	H	_	
-				<u>-</u>	H		Driller's Remark: Retrieved a handful of material -
-	R16-HQ			-	H	_	consisting of loose sand, carbonate material,
-	5 ft	0	NR	-	F	_	moderate to high HCl -
-	0%			-	囯	_	reaction, silty to sandy,light gray
-				-	囯	_	-
-				·	Ħ	_	R16:3 minutes
125	125.0			-	Ш		



PROJECT NUMBER:

338884.FL

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723154.0 N, 457653.4 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

DISCONTINUITIES     DISCONTINUITIES     DISCONTINUITIES     DISCONTINUITIES     DISCONTINUITIES   DI	WATER	LEVELS : 2.0	ft bgs	on 04	4/05/07 START : 4/5/2007 END : 4	7/200	7 LOGGER : R. McComb	
130	30£	(%		-		l g	LITHOLOGY	COMMENTS
130	DEPTH BELO SURFACE AN ELEVATION (	CORE RUN, LENGTH, ANI RECOVERY (	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
NR   136   0   126 0-127.0" - Fracture (>10)					horizontal, rough, undulating to stepped,		125.0-125.5' - pale olive to yellowish	Resume on 04/07/07; -
R17-HO	-			>10		Ħ	fine grained, rapid dilatancy, moderate HCl reaction, trace	
135 135.0  R18-HO Soft Open  R19-HO Soft Open  R	- - - - - 130	5 ft 34%		NR			Limestone  125.5-126.5' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, extremely weak (R0), voids over 10-15% of surface 126.5-126.7' - light olive gray, (5Y 5/2), mild HCl reaction, very weak (R1), voids up to 1/16" over 5-10% of	
R18-HO   Sth   20%   0   NR				>10	horizontal, rough, stepped to undulating,		No Recovery 126.7-130.0' - Limestone	_
135.0  93.7  R19-HO  Str 64%  135.6' - Fracture, 0-90 deg, smooth, undulating, open  135.6' - Fracture, rough, planar to stepped, open  135.6' - Fracture, rough, planar to stepped, open  135.95' - Fracture, rough, planar to stepped, open  136.6' - Fracture, rough, planar to stepped, open  137.95' - Fracture, rough, planar, open, tan to black stain over 100% of surface (20% black, 116' thick)  139.05' - Fracture, so deg, rough, stepped to undulating, open  140.2' - Fracture, so deg, rough, undulating, open  140.2' - Fracture, horizontal, smooth, planar, open  140.5' - Fracture, so deg, rough, undulating, open  141.5-141.9' - Fracture, horizontal, smooth, planar, open  141.5-141.9'	- - - -	5 ft		NR			to yellowish gray, (10YR 6/2 to 5Y 7/2), fine to very fine grained, mild HCl reaction, very weak (R1), voids up to 1/16" over 10-15% of surface, fossil molds and cast are rare, some solution cavities up to 1"x3/16"	
- 10	-					世	-	K 10.7 Hilliules
String HC reaction, very weak to weak (R1 to R2), 1/16" voids over 1-3% of surface, many 2"-2-3/8"x3/4"-1-3/16" cavities on rock surface, fossil molds and casts No Recovery 136.75-138.6"   String HC reaction, very weak to weak (R1 to R2), 1/16" voids over 1-3% of surface, fossil molds and casts No Recovery 136.75-138.6"   String HC reaction, very weak to weak (R1 to R2), 1/16" voids over 1-3% of surface, fossil molds and casts No Recovery 136.75-138.6"   Limestone 138.6-139.05" - light olive gray, (5Y 5/2), very fine grained, moderate HCl reaction, weak (R2), voids up to 1/16" over 1-3% of surface 139.05-139.15" - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15" - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 10% of surface, trace fossil casts and molds 139.15-140.0" - Same as 138.6-139.05" except mottled with brownish limestone   R20-HO 141.5-141.9" - Fracture, vertical, rough, undulating, tight olive gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15" - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 10% of surface, trace fossil casts and molds 139.15-140.0" - Same as 138.6-139.05" except mottled with brownish limestone   R20-HO 141.5-141.9" - Fracture, vertical, rough, undulating, tight olive gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 10% of surface, trace fossil casts and molds 139.15-140.0" - Same as 138.6-139.05" except mottled with brownish limestone   R20-HO 142.3" - Fracture, vertical, rough, undulating, tight olive gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 10% of surface, trace fossil casts and molds 139.15-140.0" - Same as 138.6-139.05" except mottled with brownish limestone   R20-HO 142.3" - Fracture, vertical, rough, undulating, tight olive gray, (5Y 7/2), very fine grained, very weak (R2), voids up to 1/16" over 1-3% of surface 139.05-139.15" -		135.0		3			<ul> <li>135.0-136.75' - yellowish gray, (5Y</li> </ul>	-
R19-HO 5 ft 64% 35 NR    138.6' - Fracture, horizontal, smooth, planar, open, tan to black stain over 100% of surface (20% black, 1/16" thick)   140	_			>10	135.6' - Fracture, 0-90 deg, smooth, stepped, open 2"-3"		strong HCl reaction, very weak to weak (R1 to R2), 1/16" voids over	-
open, tan to black stain over 100% of surface (20% black, 1/16" thick)  140	-	5 ft		NR			2"-2-3/8"x3/4"-1-3/16" cavities on rock surface, fossil molds and casts	- - -
140 140.0  -98.7  10  139.05' - Fracture, <5 deg, rough, stepped to undulating, open 139.15' - Fracture, <5 deg, rough, undulating, open 139.05' - Fracture, <5 deg, rough, undulating, open 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), voids up to 1/16" over 1-3% of surface 139.05-139.15' - yellowish gray, (5Y 7/2), very fine grained, very fine grained, very fine grained, ve	-				open, tan to black stain over 100% of surface	Ħ	138.6-139.05' - light olive gray, (5Y	R19:10 minutes
R20-HQ 5 ft 78%  R20-HQ 6 ft 78%  R20-HQ		140.0			139.05' - Fracture, <5 deg, rough, stepped to undulating, open	Ħ	reaction, weak (R2), voids up to 1/16" over 1-3% of surface	_
R20-HQ 5 ft 78%  29 3 3 3 140.5' - Fracture, horizontal, smooth, undulating, open 141.5-141.9' - Fracture zone, 0-90 deg, rough, undulating to stepped, various orientations 141.9-142.3' - Fracture, vertical, rough, undulating, tight 142.3' - Fracture, <5 deg, rough, stepped, open  139.15-140.0' - Same as 138.6-139.05' except mottled with brownish limestone  139.15-140.0' - Same as 138.6-139.05' except mottled with brownish limestone  139.15-140.0' - Same as 138.6-139.05' except mottled with brownish limestone	_			NR	open 140.2' - Fracture, horizontal, smooth, planar,		7/2), very fine grained, very weak (R1), voids up to 1/16" over 10% of	-
141.5-141.9' Fracture zone, 0-90 deg, rough, undulating to stepped, various orientations 141.9-142.3' - Fracture, vertical, rough, undulating, tight 142.3' - Fracture, <5 deg, rough, stepped, open  141.5-141.9' Fracture zone, 0-90 deg, rough ilmestone brownish limestone  141.5-141.9' Fracture zone, 0-90 deg, rough, stepped, orientations 141.9-142.3' - Fracture, vertical, rough, undulating, tight 142.3' - Fracture, <5 deg, rough, stepped, open		<b>Doc</b> ::=		>10	140.5' - Fracture, horizontal, smooth,	F	139.15-140.0' - Same as	]
141.9-142.3' - Fracture, vertical, rough, undulating, tight 142.3' - Fracture, <5 deg, rough, stepped, open R20:11 minutes	- -	5 ft		3	141.5-141.9' - Fracture zone, 0-90 deg, rough, undulating to stepped, various			
-      2   <sup>open</sup>	- -			3	141.9-142.3' - Fracture, vertical, rough, undulating, tight		- -	- R20:11 minutes
	145	145.0		2			_	-
<u>, , , , , , , , , , , , , , , , , , , </u>								



BORING NUMBER: PROJECT NUMBER: 338884.FL

**GSC-09** 

SHEET 9 OF 10

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723154.0 N, 457653.4 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER	LEVELS : 2.0	ft bgs	s on 04	4/05/07 START : 4/5/2007 END : 4/	7/200	)7	LOGGER : R. McComb	
>00	6)			DISCONTINUITIES	g	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
TH BE	E RU STH, OVEF	D (%)	FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEPT SURF	CORE	RQE	FRAC	PLANARITÝ, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3YME		AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-103.7	014	ш		142.9' - Fracture, horizontal, rough, stepped,	+ +	╁	Limestone	
_			2	open	+	ł	140.0-140.5' - light olive gray, (5Y	-
-				143.2' - Fracture, horizontal, smooth, planar, open	Ħ	1	5/2), very fine grained, moderate HCl reaction, weak (R2), voids up to	-
-			3	143.3' - Fracture, 15 deg, smooth, planar, open	岸	t	1/16" over 1% of surface (concentrated along break),	-
-	R21-HQ			143.9' - Fracture, <5 deg, rough, undulating,	世	t	1-3/16"x3/8" cavity, some infilling in	-
-	5 ft 94%	60	4	open 144.1' - Fracture, <5 deg, rough, undulating,	世	ł	cavity No Recovery 140.5-141.5'	-
_	0.70			open	₩	ł	Limestone	-
_			0	144.25' - Fracture, 60 deg, rough, stepped, tight	ፗ	1	141.5-144.1' - light olive gray, (5Y 5/2), very fine grained, mild HCl	-
_			1	145.5' - Fracture, 20 deg, rough, undulating,	I	t	reaction, very weak to weak (R1 to R2), friable from 141.5-142.5',	R21:7 minutes
150	150.0		NR	tight 145.65' - Fracture, 60 deg, rough, stepped,	┰	ſ	cavities up to 1/8"-3/16" over 40-50%	1
-108.7			2	tight — 145.45' - Fracture, 10 deg, rough, planar,	ightharpoons	I	of surface, 3/8"x3/16" cavities over 1-3% of surface, cavities and voids	
				open	brack	£	mostly present in 142.3-143.2',	
			3	146.5' - Fractures, horizontal, rough, undulating, open	F	Ł	laminated with very fine grained limestone, less than 1% voids from	_
_				146.85' - Fracture, 10 deg, smooth,	岸	1	143.6-143.8' 144.1-144.5' - light olive gray, (5Y	
_	R22-HQ 5 ft	72	2	undulating, tight 147.0' - Fracture, vertical, rough, undulating,	Ħ	1	5/2), very fine grained, mild to	_
_	100%			tight 147.1' - Fracture, horizontal, rough, planar,	Ľ	1	moderate HCl reaction, weak (R2), voids up to 3/16" over less than 1%	_
_			2	open .	世	╁	surface, two 3/16"x3/16" cavities,	_
_				147.4' - Fracture, 15 deg, smooth, planar, open, silt/clay lens (<1/16" thick)	╀	╁	trace fossil casts and molds No Recovery 144.5-146.1'	R22:7 minutes
_			1	147.55' - Fracture, 10 deg, rough, stepped,	F	1	Limestone	R22.7 Illilliutes
155 <u> </u>	155.0			<1/16" thick silty clay lenses 149.6' - Fracture, 0-50 deg, rough, stepped 7	$\perp$	H	146.1-147.1' - light olive gray with yellowish gray mottling, (5Y 5/2 with	
-				150.45' - Fracture, <5 deg, rough, undulating,	┨	Н	5Y 7/2), fine grained, mild to moderate HCl reaction, weak (R2),	-
-				150.75' - Fracture, horizontal, rough, planar,	┨	Н	voids over 5-15% of the surface,	-
_				open   151.35' - Fracture, <5 deg, rough, stepped,	┨	$\mathbf{H}$	several 3/16"x3/16" cavities, trace fossil molds and casts	-
-				open 151.7' - Fracture, horizontal, smooth, planar,	1		147.0-146.1' - Same as 144.1-144.5' 147.1-147.4' - light olive gray with	-
_				open	1		yellowish gray mottling, (5Y 5/2 with	-
_				151.85' - Fracture, horizontal, rough, stepped, open	1		5Y 7/2), fine grained, mild HCl reaction, very weak (R1), thinly	-
_				152.6' - Fracture, <5 deg, rough, undulating,	1	H	cemented, 1-3/16"-1-9/16"x1/8"	-
_				open 153.0' - Fracture, smooth, planar, 1/16" silty	1	H	cavities, occasional clay bedding parallel to bedding plane, voids up to	1
_				clay liner covers 100% of surface 153.3' - Fracture, <5 deg, rough, undulating,	1		1/16" over 1-3% of the surface 147.4-147.6' - dark yellowish brown,	1
				open	1	П	(10YR 4/2), fine grained, mild HCI	_
				153.55' - Fracture, rough, undulating, open 154.15' - Fracture, horizontal, smooth, planar.	]		reaction, extremely weak (R0), small voids over 40-50% of surface, friable	
				tight			with depth	
							147.6-149.7' - pale yellowish brown, (10YR 6/2), fine grained, mild to	
					_		moderate HCl reaction, weak (R2),	
_					1		voids over 5-10% of surface, cavities (3/16"x3/8") over 1-2% of the	]
_					1		surface, trace fossil molds and casts, cavities	]
-					1	L	No Recovery 149.7-150.0'	
-					-	F		
_					+	┞		
						_		l



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723154.0 N, 457653.4 E (NAD83)

ELEVATION: 41.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: T. Williams

WATER LEVELS : 2.0 ft bgs on 04/05/0			s on 04	4/05/07 START : 4/5/2007	END : 4/7	/2007	LOGGER : R. McComb	
>00				DISCONTINUITIES		ڻ ا	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		SII.	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	OUZE AND DEET LOS CACIONO
ᆱᇬᇋ	P.H. A.H.A	(%)	U.R.E	DEDTIL TYPE OPIENTATION POLICE	CLINECC	CIC	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
PTH A	RE CO	R Q D (%)	ACT R F(	DEPTH, TYPE, ORIENTATION, ROUG PLANARITY, INFILLING MATERIA	L AND	MBC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
SS	Sää	RG	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND	TIGHTNESS	SY	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
							Limestone	
-					-	ŀ	- 150.0-154.15' - moderate yellowish	-
-					-	ŀ	brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, weak to	-
1 -					-		extremely weak (R2 to R0), voids up	_
							to 1/16" over 25-30% of surface,	_
							cavities (3/8"x3/16" and up to 3/4"x3/8") over 1-2% of surface,	
							slightly fossiliferous, fossil casts and	
					=		molds with some original fossil	1
-					-		- material from 152.0153.0'	-
-					-	-	154.15-155.0' - very light gray to white, (N8 to N9), very fine grained,	-
					_		strong HCl reaction, very weak to	4
							extremely weak (R1 to R0), small	
							voids over 25-30% of surface, voids more prominent in the lower half of	
							the limestone (chalk-like material)	1
1 1					-		Bottom of Boring at 155.0 ft bgs on	1
					=		- 4/7/2007	1
1 -					-	-	-	-
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722899.7 N, 457706.1 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 4-7/8" drag bit ORIENTATION : Vertical

WATER	LEVELS	: 1.61 ft k	ogs on 6/	14/07	START : 4/19/2007	END : 4/22/2007	LOGO	GER	: A.	Erickson
				STANDARD		SOIL DESCRIPTION			G	COMMENTS
AND (#)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	COU NAME	LICOC ODOLID CVAROU	001.00		O C	DEDTIL OF CACING DRILLING DATE
H BE ACE ATIO		RECOVE	RY (ft)		MOISTURE	E, USCS GROUP SYMBOL CONTENT, RELATIVE DE	ENSITY OR		30LK	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENC	CY, SOIL STRUCTURE, M	INERALOGY		SYMBOLIC LOG	INSTRUMENTATION
42.3	0.0			(/	Topsoil Gradin	g To Poorly Graded Sa	nd With	寸		
-	1	1.3	SS-1	1-2-2 (4)	Organics (SP) 0.0-1.3' - gravis	h black, (N2), moist, ver	v loose, fine	1		-
-	1.5			(+)		and, 50% organics decre		7		Water level is based on Ground Water  Monitoring at LNP site (FSAR Table
					\deptil, trace nor	ipiastic lines		ر ا		2.4.12.08)
l .										Water levels not recorded during drilling
_								4		_
-	_							4		_
-	1							4		-
-	_									-
5 37.3	5.0				Silty Sand (SM)	1			114	
-	1	0.9	SS-2	3-3-3	5.0-5.9' - light bi	rown, (5Y 5/6), moist, lo	ose, fine silica	-1		-
-		0.9	33-2	(6)	sand, 15-20% n	nonplastic fines, trace org	ganics	/甘	11-11	-
-	6.5							- 1		-
-	1							1		-
-	1							1		_
-								1		
								_		_
10	10.0				0.11 0 1 (0.11)				T. P. L.	
32.3	-			0-0-1	<b>Silty Sand (SM)</b> 10.0-10.7' - pale	e orange, (10YR 8/2), we	et, loose, fine	4		Weight of hammer enough to drive of SS-3 first 12"
-	1	0.7	SS-3	(1)	\[   \to medium grain   \]	ned, strong HCI reaction, ssiliferous, carbonate ma	, 20% low	/1		_
-	11.5				(piaotio inioo, ioc	somorodo, odrbonato me	atoriai	′ <del> </del>		-
-								┪		-
-	1							┪		-
-	1							1		-
-	1							1		_
								]		
15	15.0									
27.3	15.8	0.8	SS-4	40-50/3 (90/9")	<b>Silt (ML)</b> 15.0-15.8' - grav	vish orange, (10YR 7/4).	moist, hard.			Driller's Remark: Feels like hard material
-	15.8			(30/3 )	nonplastic, rapid	yish orange, (10YR 7/4), d dilatancy, mild HCl rea sized, carbonate material	ction, 5-10%	/=	Ш	=
-	1				very line sand-s	sizeu, carbonate matena	15	-⁄ -{		-
-	-							$\dashv$		-
-	+							$\dashv$		-
-	1							$\dashv$		-
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PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722899.7 N, 457706.1 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 4-7/8" drag bit ORIENTATION : Vertical

WATER LEVELS: 1.61 ft bgs on 6/14/07					START : 4/19/2007 END : 4/22/2007	LOGGER	: A.	Erickson
				STANDARD	SOIL DESCRIPTION		g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS			SYMBOLIC LOG	
TOE TOE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLO MOISTURE CONTENT, RELATIVE DENSITY (	R, OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
FYA EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALO		WB	INSTRUMENTATION
SU				(N)			S	
22.3	20.0			28-45-43	<b>Silt (ML)</b> 20.0-21.4' - Same as 15.0-15.9'	_		_
_		1.4	SS-5	(88)	25.0 2 646 45 15.0			_
l _	21.5			. ,			Ш	_
l _								
l _								
-						_		
_	1							-
25	25.0					_		-
17.3					Silt (ML)		Ш	
-		1.5	SS-6	35-44-33	25.0-26.5' - Same as 15.0-15.9'	_		-
-	26.5			(77)		-		-
-	20.3					-		-
-	1					-		-
-	-					_		-
-						_		Driller's Remark: Water loss at 28.0'
-	-					-		-
-	-					_		-
-						-		-
30 <u> </u>	30.0				Sandy Silt (ML)		Ш	
12.5				17-32-32	30 0-31 3' - Same as 15 0-15 9' except gravish	_		-
-		1.3	SS-7	(64)	orange, 20-25% fine to coarse sand-sized, trace gravel-sized limestone, carbonate materials	e fine _		-
-	31.5				graver-sized infrestorie, carbonate materials			-
_						_		_
_						_		-
_						_		Driller's Remark: Hard drilling at 32.5'
-						_		_
1 -								_
1 -								_
35	35.0						<u> </u>	
7.3				04 00 -:	Silt With Sand (ML)	,	$\prod$	
1		1.2	SS-8	31-26-24 (50)	35.0-36.2' - yellowish gray, (5Y 7/2), moist, hard nonplastic, rapid dilatancy, mild HCl reaction, ve	erv		
1	36.5			(30)	fine to fine sand-sized, 10% fine to coarse sand	I-sized,	Ш	
1 -					\carbonate	/		
1 -								
1 -								
-						_		-
-						_		-
-						=		-
40						-		-
40								



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	GSC-10	CHEET	3 OF 10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722899.7 N, 457706.1 E (NAD83)

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 4-7/8" drag bit

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

ORIENTATION: Vertical

WATER	LEVELS	: 1.61 ft b	gs on 6/1	14/07		R : A.	Erickson
				STANDARD	SOIL DESCRIPTION	σ	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS		SYMBOLIC LOG	
CE TO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	l S	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTF PTF EVA			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	₩	INSTRUMENTATION
SC				(N)		်	
2.3	40.0			10 17 07	Sandy Silt (ML) 40.0-41.5' - Same as 35.0-36.2' except 30-35% fine to		<u> </u>
		1.5	SS-9	10-17-27 (44)	coarse sand-sized and trace organics		
	41.5			( * * )			1
						T	1
-						1	1
-						1	1
-					•	1	1
-						1	1
-						1	
	45.0					1	-
45 <u> </u>	45.0				Silty Sand (SM)	1111	Driller's Remark: Will set casing to 45.0'
			00.40	23-52-50	45.0-46.1' - Same as 40.0-41.5'	-	below ground surface
-		1.1	SS-10	(102)			
_	46.5					1	
_						4	B
_							Driller's Remark: Hard drilling at 47.0', sample was slough in sand-sized limestone
							fragments
							1
50_	50.0 50.2	0.0	00.44	F0/0	No. Do a como 50 0 50 0	1	1
-7.7	30.2	0.0	SS-11	50/2 (50/2")	No Recovery 50.0-50.2' Begin Rock Coring at 50.0 ft bgs		
-				()	See the next sheet for the rock core log	1	1
-					•	1	1
-					•	1	1
-						1	1
_						1	
-						┨	1
_						┨	-
_						-	-
-						1	-
55 <u> </u>					_	1	_
-12./						1	]
						1	]
]							1
1 7						1	1
						1	] 1
						1	1
-						1	
-						1	-
-						1	-
60_					_	+	-
						_	1



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-10 SHEET 4 OF 10

#### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722899.7 N, 457706.1 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

300				S/14/07 START : 4/19/2007 END : 4/	4/22/2007 LOGGER : A. Erickson				
	⊚ L			DISCONTINUITIES	Ö		LITHOLOGY	COMMENTS	
N (#	AND ≪AND		SH_	DESCRIPTION			ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,	
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD	
SURF	SOR!	ROI	FRAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMI		AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.	
	0.0 R1-NQ	_	2	50.01.5		╁	Limestone	R1:3 minutes	
-	1 ft	0	NR	50.2' - Fracture, 80 deg, smooth, undulating, second face of fracture has been fragmented	╁	+	50.0-50.4' - light olive gray, (5Y 5/2), fine grained, mild to moderate HCl	-	
+3	51.0 40%			into at least two subangular to subrounded elongate fragments, trace coatings/infill on all	F	7	reaction, medium strong (R3), voids	=	
1 1				fragments	Ħ	1	(1/16") over 10-40% of surface, thin elongate fossil molds mostly 1/4" and	=	
1 1						T	up to 1/2", moderately fossiliferous	-	
					]	1	No Recovery 50.4-56.0'		
	R2-NQ 5 ft	0	NR		片	1			
	0%	١ ١	'''`		Н	1		_	
					世	╁		_	
55 -12.7				_	₽	╁		R2:8 minutes	
-					$oldsymbol{\Box}$	7		NZ.0 IIIIIIUles -	
5	6.0		0		oxdamma	7	Limestone	-	
<b>I</b>			$\dashv$		ፗ	‡	56.0-56.3' - dusky yellow, (5Y 6/4),	-	
-					仜	1	fine grained, moderate HCl reaction, weak to medium strong (R2 to R3),	Core stuck in HW casing	
1 1					世	‡	voids (1/16") over 25% of surface, 1/8" thin elongate fossil molds some	-	
	R3-NQ				╁	ł	larger 1/4"-1/2" cavities and fossil	-	
1 1	5 ft 7%	7	NR		╁	╁	molds No Recovery 56.3-61.0'	=	
1 1					$\vdash$	+	•	_	
60				_	F	Ł			
-17.7					Ė	Ţ		R3: Run time not recorded	
_6	51.0				井	1		_	
			>10	61.35' - Fracture, horizontal, rough,	井	‡	<b>Limestone</b> 61.0-62.45' - moderate yellowish	-	
		•		undulating, tight to healed 61.5-61.7' - Fractures, horizontal, multiple	井	‡	brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, very weak	-	
-			>10	fractures with fine bedding planes and	+	+	to weak (R1 to R2), numerous	=	
I -	R4-NQ			organic laminations, nearly crush, very open 62.0, 62.2, 62.35' - Fractures (3), horizontal,	-	F	1/16"-3/16" voids, thick black horizontal bedding plane laminations,	-	
	5 ft 70%	13	1	smooth, planar, open 62.7-63.8' - Fracture, angular black sediment	-	Ŀ	elongate 1/4" long fossil molds and casts throughout, moderately	=	
	7 0 70		0	63.8' - Fracture, 10 deg, rough, undulating	$oldsymbol{oldsymbol{\square}}$	+	fossiliferous	-	
65					$\Box$	+\	Silty Sand (SM) 62.45-63.8' - moderate yellowish	-	
-22.7			NR	_	H	1	brown, (10YR 5/4), nonplastic, mild	R4:7 minutes	
6	6.0				丌	1	to moderate HCl reaction, 60% fine sand, 30% fines, 10% limestone	 	
I T			1		口	[	fragments, non-cohesive, massive, easily friable and ground to fine		
				66.6' - Fracture, horizontal, rough, planar,	上	1	sand, calcareous		
			0	followed by non to weak sediment/rock 66.6-70.5' - Fractures, 0-20 deg, occasionally	口	‡	<b>Limestone</b> 63.8-64.5' - moderate yellowish	_	
	DE NO			more of a fracture zone, silt-sized fragments	$\perp$	+	brown, (10YR 5/4), fine grained,	-	
<b>I</b>	R5-NQ 5 ft	10	0		$\pm$	+	moderate HCl reaction, medium strong (R3), voids (1/16") over	=	
<b>I</b> -	90%				+	$\pm$	20-25% of surface, trace larger up to 3/16" voids and fossil molds, trace	=	
			0		F	}	organic black beds	-	
70					F	╁	No Recovery 64.5-66.0'		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-10 SHEET 5 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722899.7 N, 457706.1 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS: 1.6	31 ft b	gs on 6	6/14/07 START : 4/19/2007 END : 4/	22/200	D7 LOGGER : A. Erickson	
30₽	<u> </u>			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
SELO E AN ON (f	UN, ANE: RY (9	(5)	RES	DESCRIPTION	JO C	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	SPIN	R Q	FR/	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYF	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-27.7			0		H	Limestone - 66.0-66.6' - moderate yellowish	R5:6 minutes
_	71.0		NR	74.0.70.01	$\vdash$	brown, (10YR 5/4), fine grained,	_
-			0	71.0-72.9' - Fractures, several horizontal breaks	П	extremely weak to medium strong (R0 to R3), no voids where extremely	_
-						weak rock (R0), voids (1/16") over 5% of surface where medium strong	-
-			1	-	H	<ul> <li>(R3), trace organics, strong HCI</li> </ul>	-
-	R6-NQ			72.9' - Fracture, horizontal, rough, undulating	ш	reaction where extremely weak rock (R0) at the top, moderate HCl	-
-	5 ft 78%	18	2	73.5, 73.6' - Fractures (2), horizontal, smooth	口	<ul> <li>reaction where medium strong (R3) at the bottom</li> </ul>	-
-			1	to rough, planar, open 74.1' - Fracture, horizontal, smooth, planar,	ш	66.6-70.5' - dark yellowish orange,	-
75 <u></u>				open	団	<ul> <li>(10YR 6/6), fine grained, strong HCl reaction, very weak (R1), fine voids</li> </ul>	]
-32.7			NR		Ш	over 0-3% of surface, friable No Recovery 70.5-71.0'	End of core at 74.9', matches/mates with next
_	76.0					Limestone 71.0-72.9' - dark yellowish orange to	core at 76.0' R6:6 minutes
-			0	-	団	_ grayish orange, (10YR 6/6 to 10YR	-
_				77.05! Fracture 10 des rough undulation		7/4), fine grained, strong HCl reaction, extremely weak to very	-
-			3	77.05' - Fracture, 10 deg, rough, undulating 77.2' - Fracture, horizontal, rough, planar,	+	weak (R0 to R1), friable 72.9-74.1' - Same as 71.0-72.9'	-
-	R7-NQ			healed 77.65, 77.9' - Fractures (2), horizontal,	$\Box$	except very weak (R1)	-
-	5 ft 96%	60	>10	smooth, planar, tight to open 78.0-78.8' - Fractures, horizontal, multiple	H	_ 74.1-74.9' - moderate yellowish brown, (10YR 5/4), fine grained,	-
-	3070			breaks	Ħ	moderate to strong HCl reaction, weak to medium strong (R2 to R3),	-
80			2	79.05' - Mechanical break, 10 deg, rough, undulating	H	voids (1/16"-1/8") over 25-30% of	-
-37.7			1	79.5' - Fracture, horizontal, rough, stepped, open, missing portion of fracture	H	<ul> <li>surface, trace organics, 1/16"</li> <li>fossils/molds, highly fossiliferous</li> </ul>	R7:7 minutes
_	81.0		NR	80.05' - Fracture, 10 deg, rough, planar, tight	H	No Recovery 74.9-76.0'  Limestone	
_			2	81.25' - Fracture, 10 deg, rough, planar,	H	76.0-77.05' - moderate yellowish	Core essentially alternates between the two rock types -
-				healed 81.75' - Fracture, 10 deg, rough, planar, open	H	brown, (10YR 5/4), fine grained, moderate HCl reaction, medium	in 81.0-81.75' and 81.75- 84.2'
-			2	82.35' - Fracture, horizontal, rough, planar,	廿	strong (R3), voids (1/16"-1/8") over 25% at top reducing to 0% voids with	-
-	R8-NQ			open with 1/4" infill on each face (coating is same as lithology described for 81.0-81.75')	丗	<ul> <li>depth (transition sharpest at 76.6')</li> </ul>	-
-	5 ft 100%	67	0	, .	Ш	77.05-79.55' - moderate yellowish brown, (10YR 5/4), fine grained,	-
-	100 /0			83.75' - Fracture, horizontal, rough, undulating, tight	Ш	<ul> <li>moderate to strong HCl reaction, very weak to extremely weak (R1 to</li> </ul>	-
85			3	84.2-84.4 - Fractures, horizontal, rough, undulating, filled with material as described	$\boxminus$	R0), 0% to trace voids, friable  — 79.55-80.8' - moderate yellowish	]
-42.7			>10	for 81.0-81.75'	oxdot	brown, (10YR 5/4), moderate to	R8:15 minutes
_	86.0		- 10	84.75' - Fracture, 10 deg, rough, planar, tight to open with fine coating of infill similar to	븬	strong HCl reaction, medium strong to very weak (R3 to R1), voids	
_			5	82.35' 85.2' - Fracture, horizontal, rough, stepped,	$\Box$	(1/16"-3/8") over 30% of surface from 76.0'-77.05', decrease in voids	_
-				very open, with fragments	Щ	_ (1/16") to 3% of surface	-
-			8	85.3' - Fracture, horizontal, smooth, planar 85.3-86.0' - Fractures, several horizontal and	H	No Recovery 80.8-81.0' Limestone	-
-	R9-NQ			vertical, angular (1/2"-3") fragments 86.1' - Fracture, 10 deg, smooth, stepped,	囯	<ul> <li>81.0-81.75' - moderate yellowish brown to pale yellowish brown,</li> </ul>	-
-	5 ft 78%	13	>10	tight to open, subangular to subrounded	口	(10YR 5/4 to 10YR 6/2), fine grained,	-
-	1070			fragments 86.25, 86.35, 86.4, 86.5' - Fractures (4),	口	strong HCl reaction, very weak (R1)	-
90			>10	horizontal, rough, planar to undulating, tight	囯	-	-



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-10 SHEET 6 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722899.7 N, 457706.1 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 1.6	61 ft b	gs on (	6/14/07 START : 4/19/2007 END : 4/2	22/20	07 LOGGER : A. Erickson	
>00	(0			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-47.7			NR	87.15' - Fracture, horizontal and 30 deg, rough, planar, open	Ė	Limestone - 81.75-84.2' - moderate yellowish	R9:9 minutes
-	91.0		5	87.3, 87.4, 87.55' - Fractures (3), horizontal, smooth, rounded rock fragments 87.9, 88.25, 88.35, 88.6, 88.8, 89.2, 89.4' -		brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, strong (R4), voids (<1/16") over 5-15% of surface, except for 1"	]
-			3	Fractures (7), horizontal, significant fragmentation in places 89.45-89.9' - Fracture zone, 30 deg 91.0-91.4' - Fracture zone, several large		interval at 83.4' with 25% voids on surface 84.2-84.4' - Same as 81.0-81.75'	
_	R10-NQ 5 ft 88%	38	5	subangular fragments with weathered appearance, very open 91.7' - Fracture, 20 deg, rough, planar, tight		except extremely weak (R0)  - 84.4-85.3' - Same as 81.75-84.2' except weak (R2), voids over 3% of	-
95			1	92.5' - Fracture, horizontal, rough, undulating, fragmentation - 92.6' - Fracture, 60 deg, rough, undulating,		surface, this material more of a transition between the two types from 81.0-84.2'	_
-52. <del>7</del> -	96.0		0 NR	tight 92.8' - Fracture, 60 deg, rough, planar, tight 93.3' - Fracture, 45 deg, rough, planar, tight 93.7' - Fracture, horizontal, rough, planar,		85.3-86.0' - Same as 81.0-81.75' - except strong HCl reaction, very weak (R1) - 86.0-86.5' - moderately yellowish	R10:8 minutes -
-			0	very open, material beneath is discontinuous and somewhat fragmented 93.9' - Fracture, horizontal, rough, stepped,		brown, (10YR 5/4), fine grained, moderate to strong HCI reaction, weak (R2), fine organic inclusions,	-
-	R11-NQ		0	very open with fragmentation, subangular 95.0' - Fracture, horizontal, rough, stepped, with missing fragments		no voids 86.5-87.1' - Same as 86.0-86.5' except fine (<1/16") voids over 30%	_
-	5 ft 94%	78	1	98.75' - Fracture, horizontal, rough, stepped, - tight		of surface (up to 40% at 86.6'), few larger 1/4" cavities/fossil molds 87.1-88.9' - Same as 86.0-86.5' except very weak to weak (R1 to R2),	]
100 -57.7			0	99.05, 99.15' - Fractures (2), horizontal, rough, undulating, very open with weathered appearance in zone of increased		voids vary over 10-30% of surface  88.9-89.9' - Same as 86.0-86.5' except weak to medium strong (R2 to	R11:7 minutes
_	101.0		NR 6	voids/cavities 99.75' - Fracture, horizontal, rough, undulating, tight 99.95' - Fracture, horizontal, smooth, planar,		R3), 10% voids (<1/16"), few larger (1/4") cavities/fossil molds No Recovery 89.9-91.0'	]
-			5	very open with apparent change of rock type abruptly at fracture  100.0-103.5' - 3 to 4 large 1-1/2" fragments,		Limestone 91.0-91.4' - dark yellowish orange, (10YR 6/6), fine grained, moderate to strong HCl reaction, very weak (R1),	-
-	R12-NQ 5 ft	47	1	primarily horizontal breaks along lignite _ lamination 100.55' - Fracture, horizontal, planar, black -		strong not reaction, very weak (RT), - fine voids over 10% of surface, 1/4" rounded gray inclusions 91.4-95.4' - moderate yellowish	Driller's Remark: 20% water loss at 103.0' -
- 105	74%		5	bedding plane/lamination, tight 101.8' - Fracture, horizontal, rough, stepped, open to fragments beneath 101.8-102.0' - subangular rock crush 1" in		<ul> <li>brown, (10YR 5/4), moderate to strong HCl reaction, weak to medium strong (R2 to R3), no voids</li> </ul>	-
-62. <del>7</del>	106.0		NR	size 102.15' - Fracture, 70 deg, rough, undulating, open to overlying fragments and terminating		<ul> <li>91.5-91.8', voids (1/16") over 10-20% of surface elsewhere, some fossil cavities/molds variably up to 1/2", though most smaller, poorly</li> </ul>	R12:7 minutes
-			2	at 101.8' horizontal fracture and at 102.3' 102.7, 102.75' - Fractures, horizontal, smooth, stepped, tight		fossiliferous  No Recovery 95.4-96.0' Limestone	]
-	R13-NQ		0	103.0' - Fracture or mechanical break, 30 deg, rough, undulating, tight - 104.1' - Fracture, horizontal, rough, planar, followed by fragments		96.0-98.75' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction,	
-	5 ft 76%	48	>10	10 104.1-104.7' - Fracture zone, contains a large - 3" fragment but some subangular vertical and horizontal fragments		medium strong (R3), voids (1/16") over 3-10% of surface, few cavities/molds up to 1/2", but most are 1/4"	
110			2	-		-	-



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722899.7 N, 457706.1 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS: 1.6	1 ft b	gs on 6	6/14/07 START : 4/19/2007 END : 4/	22/200	D7 LOGGER : A. Erickson	
> O :	(9)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE ATIC	: RU :TH, :VEF	(%) Q	FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT URF LEV	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-67.7	072	ď	μΔ		S		D42/5 minutes
-07.7			NR	106.35, 106.55' - Fractures (2), 10 deg, rough, undulating, open, fine calcareous		98.75-99.95' - Same as 96.0-98.75' - except weak (R2), voids from	R13:5 minutes
_	111.0			infill/coating	Н	15-40% of surface, increased voids	_
_			0	108.25, 108.6' - Fractures (2), 20 deg, rough, stepped, very open, with dissolved	Ш	and cavities at 98.75-99.2', with  - fractures	_
_				appearance	Ш	Limestone	_
_			2	108.6-109.1' - Fracture zone, subangular, primarily 1/2"-3/4" with a few larger fragments	Н	99.95-100.7' - Same as 96.0-98.75' - except weak to medium strong (R2 to	_
			_	109.1' - Fracture, horizontal, rough, stepped,	Я	R3), voids decrease with depth from	_
	R14-NQ 5 ft	80	4	terminates fracture zone 112.45' - Fracture, 45 deg, rough, stepped,		5% to 0% of surface where black laminations (<1/16" thick each)	
	100%	00	_	nearly healed	Н	become darker brown/gray banded	
			2	112.8' - Fracture, horizontal, rough, stepped, open	Ш	organics No Recovery 100.7-101.0'	
115			-	113.5' - Fracture, 30 deg, rough, stepped,		Limestone	
-72.7				open — 113.7, 114.0' - Fractures (2), horizontal,	Ш	101.0-101.8' - dark yellowish brown, (10YR 4/2), fine grained, moderate to	R14:6 minutes
	116.0		8	rough, planar, open to tight	Н	strong HCl reaction, strong (R4),	
-				113.85' - Fracture, vertical, rough, undulating, tight, bounded by overlying and underlying	Н	voids over 3% of surface, few 1/4" elongated fossil casts, banded black	1
-			2	horizontal fractures	Ш	organics (lignite) in upper portion	
				114.2' - Fracture, 10 deg, smooth, undulating,	Н	turning to minor with depth 101.8-104.7' - moderate yellowish	
_			4	very open 114.95-115.1' - Fractures, rough, stepped,	Ш	brown, (10YR 5/4), fine grained,	_
-	R15-NQ			subangular rock fragments bounded by	ш	moderate to strong HCl reaction,	_
-	5 ft 72%	13	>10	horizontal fractures 115.3, 115.5' - Fractures (2), 20-30 deg,	$\mathbb{H}$	strong (R4), voids (1/16") over 25% of surface, thin elongated 1/4"-1/2"	-
-	12/0		3	rough, undulating, tight to open	Ħ	fossil molds, few larger cavities up to	-
120				116.85, 116.95, 117.05, 117.1' - Fractures (4), 0-10 deg, rough to smooth, planar to	Ш	_ 3/4", small casts (1/4"), fossiliferous No Recovery 104.7-106.0'	-
-77.7			NR	undulating, along bedding planes —	╁┼╁	- Limestone	R15:7 minutes
-	404.0		INIX	117.35' - Fracture, horizontal, rough, stepped, open	田	_ 106.0-109.8' - moderate yellowish brown, (10YR 5/4), fine grained,	-
-	121.0			117.6' - Fracture, horizontal, rough, stepped	ш	moderate to strong HCl reaction,	Driller's Remark: 100%
-			>10	118.3' - Fracture, horizontal, rough, stepped, terminates the fragments	ш	strong (R4), some short, weaker fracture zones, voids (1/16") over	water loss at 120.0'
-				118.45-119.1' - Fracture zone, rock	+	- 25% of surface, many round to oval	Quite possible no recovery
-			4	fragments, grayer subangular rock fragments from 1/2"-1"	ဓ	1/4" fossil molds, increased size and frequency of cavities (up to 1/2") at	is from fracture zone of
-	R16-NQ			119.75' - Fracture, vertical, rough, undulating,	丗	- 108.25-109.1'	118.0' (which would shift down to 119.6')
-	5 ft	32	0	from overlying rock fragments to end core at 119.6' some fragmentation/splitting	╀┤	No Recovery 109.8-111.0' Limestone	<b>_</b>
-	70%		2	121.0-121.9' - Fractures (12), horizontal,	冏	- 111.0-116.0' - moderate yellowish	-
				every 1/2"-1", all tight to open with rounding 122.05, 122.2, 122.25, 122.3' - Fractures (4),	団	brown, (10YR 5/4), fine grained, moderate HCl reaction, weak to	-
125_ -82.7			NR	horizontal, smooth, undulating, open to tight —	Ш	— medium strong (R2 to R3), voids	R16:5 minutes
-			INE	124.05' - Fracture or mechanical break, 20 deg, rough, undulating, healed	+	(1/16") over 25-40% of surface,  1/4"-1" areas of lighter-colored infill	-
-	126.0			124.3' - Fracture, horizontal, rough,	口	<ul> <li>with strong HCl reaction; infill is</li> </ul>	-
-			8	undulating, tight	丗	clayey in texture often not at fractures	-
-				126.6' - Fracture, horizontal, smooth, stepped, open to fragments/fracture zone	₽₩	_ 116.0-118.0' - moderate yellowish	-
-			>10	below	Ш	brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2),	-
-	D47 NO			126.6-127.5' - Fracture zone, subangular and angular fragments 1/2"-2", browner at top,	団	voids (1/16") voids over 5% of	-
-	R17-NQ 5 ft	53	7	grayer at bottom	╀┤	surface, fine bedding planes particularly from 116.65-117.1',	-
-	78%			127.5' - Fracture, horizontal, rough, stepped, fracture terminates fracture zone, gray	ဓ	except at 117.6-118.0' where rock is	_
-			0	fragments above, brown limestone beneath,	H	friable and extremely weak (R0)	-
130			$\vdash$	abrupt transition at fracture	H	-	



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-10 SHEET 8 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722899.7 N, 457706.1 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

WATER	LEVELS : 1.6			6/14/07 START: 4/19/2007 END: 4/2		07 LOGGER : A. Erickson	
			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-87.7			NR	128.2-128.5' - Fracture, horizontal, rough, stepped, leads into several inches of angular	Ï	118.0-119.6' - light olive gray, (5Y – 3/2), fine grained, moderate to strong	R17:6 minutes
-	131.0		1	(1/4"-1/2") fragments 128.75' - Fracture, horizontal, rough, planar, tight	Ħ	HCl reaction, medium strong (R3), voids (1/16") over 5-10% of surface  No Recovery 119.6-121.0'	-
-			4	131.8' - Fracture, horizontal, rough, planar, ight		Limestone 121.0-124.5' - yellowish gray, (5Y 8/1), very fine grained, strong HCl	_
_	R18-NQ 5 ft	57	7	132.7' - Fracture, horizontal, smooth, planar, open		reaction, weak (R2), voids (1/16") over 5% of surface, trace fossil imprints (mostly on fracture faces),	
_	86%	31		132.7-133.5' - Fractures, smooth, planar, rock fragments (fragments broken in horizontal plane, then broken again)		after 122.05' inclusion of gray very fine to fine grained particles beginning as very fine particles	-
135_ -92.7			5		H	transition to fine to medium grained and yellowish gray (5Y 7/2) after 122.5', less friable	R18:8 minutes
-	136.0		NR	135.1' - Fracture, horizontal, smooth, planar, smooth to planar lower face, open 135.2, 135.25, 135.3' - Fractures (3),		No Recovery 124.5-126.0' Limestone	_
-			>10 0	horizontal, smooth, planar 135.1-135.3' - Fracture zone, horizontal, planar	Ħ	L 126.0-127.5' - moderate yellowish brown to dark yellowish orange, (10YR 5/4 to 10YR 6/6), moderate	-
- - - -	R19-NQ 5 ft 22%	7	NR	136.0-136.6' - Fractures, horizontal, smooth, planar, angular fragments 136.6' - Fracture, horizontal, smooth, planar, terminates fragments 136.8' - Fracture, horizontal, rough, planar, open to tight		HCl reaction, medium strong (R3), some subtle change in color with olive gray (5Y 3/2) fragments, 127.0-127.5' voids over 5% of surface, few 1/4" cavities 127.5-129.9' - moderate yellowish brown, (10YR 5/4), moderate HCl	- - - -
140 -97.7 -						reaction, medium strong (R3), voids — (1/16"-3/8") over 15% of surface, many 1/8"-1/4" cavities No Recovery 129.9-131.0'	R19:4 minutes
-	141.0		>10	141.0-141.9' - Fracture zone, with angular rock fragments -		- Limestone 131.0-132.7' - moderate yellowish brown, (10YR 5/4), moderate HCl	-
_			>10	141.2' - Fracture, 10 deg, rough, stepped, open to fragmented 141.4' - Fracture, 10 deg, rough to smooth,		<ul> <li>reaction, medium strong (R3), voids (1/16"), many 1/4" cavities (elongate and round up to 3/4")</li> </ul>	-
-	R20-NQ 5 ft 60%	25	3	stepped to undulating, open to fragmented 141.7, 141.9' - Fracture (2), 20 deg, rough, stepped, open with cavities/fragmentations 142.15' - Fracture, 20 deg, rough, stepped.		<ul> <li>132.7-135.3 - moderate yellowish brown to dusky yellow, (10YR 5/4 to 5Y 6/4), moderate to strong HCl</li> </ul>	]
- 145 -102.7	3070		NR	very open 142.6' - Fracture, 10 deg, rough, stepped, open to fragmented 142.8, 143.05' - Fractures (2), 10 deg, rough, stepped, open		<ul> <li>reaction, medium strong (R3), voids over 3% of surface with occasional zones of 15% coverage, no to few</li> <li>cavities except at zones with more voids, HCI reaction is strongest in</li> </ul>	R20:10 minutes
_	146.0		4	142.6-142.8' - 1/2"-3/4" angular fragments 143.1' - Fracture, vertical, rough, stepped, 1" long	Ė	zones with few voids No Recovery 135.3-136.0' Limestone	_
-			2	143.15' - Fracture, horizontal, rough, stepped, discontinuity, smooth on upper side, rough to planar on low side		136.0-137.1' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCI reaction, medium	
-	R21-NQ 5 ft	48	1	143.8' - Fracture, horizontal, rough, planar to undulating, open 146.6, 146.7, 146.8, 146.9' - Fractures (4),	F	strong (R3), voids over 0-5% of surface with occasional band of increased voids (and small cavities),	_
_	72%	70	>10	horizontal, rough, planar, open, concurrent with increasing voids (described in lithology) 147.35' - Fracture, 0-60 deg, rough,	Ė	generally no cavities, harder where no voids, weaker where voids are present	-
150				undulating, tight, with infill	H	No Recovery 137.1-141.0'	



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-10 SHEET 9 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722899.7 N, 457706.1 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

	LEVELS : 1.6			6/14/07 START : 4/19/2007 END : 4/2		007 LOGGER : A. Erickson	
			,0 0	DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-107.7 -	151.0		NR	147.65' - Fracture, horizontal, smooth, rounded on upper grayer surface, sharp, smooth to planar, 0 deg on bottom		Limestone - 141.0-144.0' - light olive gray transitioning to pale yellowish brown	R21:6 minutes
-			0	148.75' - Fracture, 30 deg, smooth, planar, tight to healed - 149.25' - Fracture, horizontal, rough, planar,		to grayish orange, (5Y 5/2 to 10YR - 6/2 to 10YR 7/4), fine to very fine grained, moderate HCl reaction,	
-			0	tight to open 149.95-149.6' - Fracture zone, subangular - fragments	Ħ	strong (R4), 141.0-143.15' voids over 5% of surface, several 1/4" long and some larger cavities, 143.15-144.0'	-
-	R22-NQ 5 ft 84%	58	7	153.0' - Fracture, horizontal, rough, planar, zone of increased voids with some bedding planes and laminar features		no voids, no cavities, more brown in color with turbid-looking laminations, black organic inclusions and laminations (milky/blurred	-
155_ -112.7			1	153.25, 153.3' - Fractures (2), horizontal, rough, undulating, open with some very minor - fragmentation 153.5' - Bedding plane, horizontal, rough to	H	laminations (miny)burieu laminations) No Recovery 144.0-146.0' Limestone	R22:8 minutes
-112.7	156.0		NR	smooth, planar, open 1/8" - 153.7, 153.8, 153.9' - Bedding plane (3), horizontal, rough, planar, open, bedding		146.0-147.65' - light olive gray, (5Y 5/2), fine to very fine grained, moderate HCl reaction, medium	- 1,722.0 Hillitutes
-			1	planes ridged and 1/8"-1/4" thick, no bedding planes after last fracture 154.8' - Fracture, horizontal, rough,		strong to strong (R3 to R4), voids (1/16") over 0-3% of surface but 1" bands of 10% with 1/4" elongate	-
-	R23-NQ		2	undulating, open - 156.85' - Fracture, horizontal, rough, planar, open -		fossil molds <b>Limestone</b> 147.65-149.6' - dark yellowish	- -
-	5 ft 76%	53	4	157.25' - Fracture, horizontal, smooth, planar, tight 157.8' - Fracture, 70 deg, rough, planar,		orange, (10YR 6/6), moderate HCI reaction, medium strong (R3), voids (1/16") over 30% of surface at top to voids (1/16"-3/8") increasing	-
160 -117.7			3 NR	completely healed, closed, but broken open by load testing, surface is nearly 100% dark gray 158.65, 158.75, 158.85' - Fractures (3),	Ħ	gradually by end of core to 50% of surface, very few larger cavities, though few elongated very thin up to	R23:8 minutes
-	161.0			horizontal, smooth, planar, tight to open, weathered 159.1' - Fracture, horizontal, rough to	H	1/2" long, some organic inclusions and secondary recrystallization No Recovery 149.6-151.0'	Total depth of boring is
- -				smooth, stepped to planar, open 159.4, 159.5' - Fractures, 10 deg, rough, undulating, tight, weathered		Limestone 151.0-152.6' - moderate yellowish brown to light olive gray, (10YR 5/4	161.0'
-				-		to 5Y 5/2), fine to very fine grained, moderate HCl reaction, strong (R4), voids (1/16") over 3% of surface,	-
-				-		inclusion of fine (1/16") black organics, few 1/4" infilled cavities 152.6-155.2' - moderate yellowish brown, (10YR 5/4), fine grained, mild	-
-				<del>-</del>		to moderate HCl reaction, medium strong to strong (R3 to R4), voids  (1/16") over 5-10% of surface, but	_
-				- -		some variability along core, few 1/4" cavities, trace organic inclusions, few laminar features at 153.0-153.9'	-
-				- -		No Recovery 155.2-156.0'   Limestone	- -
-				-		moderate HCl reaction, medium strong (R3), voids over 5% of surface to 156.9' increasing to 10-30% to	- -
-				_		157.65', few 1/4" cavities increasing at 156.8-157.2'	-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-10	SHEET	10	OF	10	

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722899.7 N, 457706.1 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

DISCONTINUATES  DESCRIPTION  DEPTH, TYPE, ORIGINATION, ROUGHINESS, DEP	WATER	WATER LEVELS : 1.61 ft bgs on 6/14		qs on 6			200	7 LOGGER : A. Erickson	
Limestone  157.65-158.5' - dusky yellow to grayish orange, (5Y 6/4 to 10YR 7/4), very fine grained, moderate HCl reaction, strong (R4), no voids or cavities except one 1/2" discrete band with 10% voids  158.5-159.8' - Same as 156.0-157.65' except voids (1/16") over 10-20% of surface, few bands (1/2") of lighter and darker brown oriented 20 deg from horizontal No Recovery 159.8-161.0' Bottom of Boring at 161.0 ft bgs on	>00	<u> </u>			DISCONTINUITIES		" [	LITHOLOGY	COMMENTS
Limestone  157.65-158.5' - dusky yellow to grayish orange, (5Y 6/4 to 10YR 7/4), very fine grained, moderate HCl reaction, strong (R4), no voids or cavities except one 1/2" discrete band with 10% voids  158.5-159.8' - Same as 156.0-157.65' except voids (1/16") over 10-20% of surface, few bands (1/2") of lighter and darker brown oriented 20 deg from horizontal No Recovery 159.8-161.0' Bottom of Boring at 161.0 ft bgs on	N (ft)	-,N N N N N N N		S <sub>III</sub> .	DESCRIPTION	7	Š,	ROCK TYPE. COLOR.	OIZE AND DEDTH OF CACCO
Limestone  157.65-158.5' - dusky yellow to grayish orange, (5Y 6/4 to 10YR 7/4), very fine grained, moderate HCl reaction, strong (R4), no voids or cavities except one 1/2" discrete band with 10% voids  158.5-159.8' - Same as 156.0-157.65' except voids (1/16") over 10-20% of surface, few bands (1/2") of lighter and darker brown oriented 20 deg from horizontal No Recovery 159.8-161.0' Bottom of Boring at 161.0 ft bgs on	ᆱᇰᆮ	A.H.	(%)	URE DOT	DEDTH TYPE OPIENTATION POLICHNESS			MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
Limestone  157.65-158.5' - dusky yellow to grayish orange, (5Y 6/4 to 10YR 7/4), very fine grained, moderate HCl reaction, strong (R4), no voids or cavities except one 1/2" discrete band with 10% voids  158.5-159.8' - Same as 156.0-157.65' except voids (1/16") over 10-20% of surface, few bands (1/2") of lighter and darker brown oriented 20 deg from horizontal No Recovery 159.8-161.0' Bottom of Boring at 161.0 ft bgs on	PTH EVA	NGT CO	) Q (	ACT R F(	PLANARITY, INFILLING MATERIAL AND	s,   }	MBC	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
Limestone  157.65-158.5' - dusky yellow to grayish orange, (5Y 6/4 to 10YR 7/4), very fine grained, moderate HCl reaction, strong (R4), no voids or cavities except one 1/2" discrete band with 10% voids  158.5-159.8' - Same as 156.0-157.65' except voids (1/16") over 10-20% of surface, few bands (1/2") of lighter and darker brown oriented 20 deg from horizontal No Recovery 159.8-161.0' Bottom of Boring at 161.0 ft bgs on	SC	응필盟	R	FR	THICKNESS, SURFACE STAINING, AND TIGHTN	NESS 2	S√	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
grayish orange, (5Y 6/4 to 10YR 7/4), very fine grained, moderate HCl reaction, strong (R4), no voids or cavities except one 1/2" discrete band with 10% voids  158.5-159.8' - Same as 156.0-157.65' except voids (1/16") over 10-20% of surface, few bands (1/2") of lighter and darker brown oriented 20 deg from horizontal No Recovery 159.8-161.0'  Bottom of Boring at 161.0 ft bgs on						$\neg \dagger$	┪	Limestone	
very fine grained, moderate HCI reaction, strong (R4), no voids or cavities except one 1/2" discrete band with 10% voids  158.5-159.8' - Same as 156.0-157.65' except voids (1/16") over 10-20% of surface, few bands (1/2") of lighter and darker brown oriented 20 deg from horizontal No Recovery 159.8-161.0' Bottom of Boring at 161.0 ft bgs on	-					-	ı	- 157.65-158.5' - dusky yellow to	-
reaction, strong (R4), no voids or cavities except one 1/2" discrete band with 10% voids  158.5-159.8' - Same as 156.0-157.65' except voids (1/16") over 10-20% of surface, few bands  (1/2") of lighter and darker brown oriented 20 deg from horizontal  No Recovery 159.8-161.0'  Bottom of Boring at 161.0 ft bgs on	-					-	ŀ	_   grayish drange, (51 6/4 to 101R 7/4),   very fine grained, moderate HCl	-
band with 10% voids  - 158.5-159.8' - Same as 156.0-157.65' except voids (1/16") over 10-20% of surface, few bands (1/2") of lighter and darker brown oriented 20 deg from horizontal No Recovery 159.8-161.0'  Bottom of Boring at 161.0 ft bgs on	_					-	ŀ	<ul> <li>reaction, strong (R4), no voids or</li> </ul>	_
-   158.5-159.8' - Same as   156.0-157.65' except voids (1/16")   over 10-20% of surface, few bands   (1/2") of lighter and darker brown oriented 20 deg from horizontal   No Recovery 159.8-161.0'   Bottom of Boring at 161.0 ft bgs on	_					4	ŀ	_ cavities except one 1/2" discrete	-
-   156.0-157.65' except voids (1/16") over 10-20% of surface, few bands (1/2") of lighter and darker brown oriented 20 deg from horizontal No Recovery 159.8-161.0' - Bottom of Boring at 161.0 ft bgs on	_						ı	- 158.5-159.8' - Same as	_
- (1/2") of lighter and darker brown oriented 20 deg from horizontal - No Recovery 159.8-161.0' - Bottom of Boring at 161.0 ft bgs on								156.0-157.65' except voids (1/16")	_
oriented 20 deg from horizontal No Recovery 159.8-161.0' Bottom of Boring at 161.0 ft bgs on								over 10-20% of surface, few bands	
No Recovery 159.8-161.0'  Bottom of Boring at 161.0 ft bgs on						1	Ī	oriented 20 deg from horizontal	_
Bottom of Boring at 161.0 ft bgs on  4/22/2007	_					-	ı	No Recovery 159.8-161.0'	-
	1 -					- 1	ŀ	- Bottom of Boring at 161.0 ft bgs on	-
	-					-	ŀ	4/22/2007	_
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	GSC-11	SHEET	1	OF	10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722723.7 N, 457915.1 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

DRILLING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8" drag bit ORIENTATION : Vertical

WATER	LEVELS	: 1.7 ft bo	gs on 2/1	1/07 5	START : 2/7/2007 END : 2/12/2007 LOC	GGER	: T.	Stewart, C. Sump
				STANDARD	SOIL DESCRIPTION		g	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME LISCS COOLID SYMBOL COLOD		SYMBOLIC LOG	DEDTH OF CASING DOLLING DATE
TH BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
SUR!			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMI	INSTRUMENTATION
42.9				(. •)		$\dashv$		Begin drilling at 15:00
-	1					-		-
-						1		24" split spoon
1 ]						]		
_						_		_
-						_		-
-	3.5				Silty Sand (SM)		TITE	-
-	-		SS-1	1-2-1	3.5-4.25' - gravish orange, (10YR 7/4), wet, very	-		-
		0.8	55-1	(3)	loose, 20% nonplastic fines, fine gravel fragment, non-calcareous, very fine grained to cemented silt,	A		-
5 37.9	5.0				silica sand	_/┤		<del>-</del>
-						-		-
-						-		-
_						_		_
_	8.5				Describe Overded Count With Overseign (OD)			-
-			00.0	1-1-3	Poorly Graded Sand With Organics (SP) 8.5-9.6' - dusky yellowish brown, (10YR 2/2), wet, ve	ery –		-
		1.1	SS-2	(4)	loose, 15-20% fine organics, fine silica sand			-
10 32.9	10.0					-		_
-						-		-
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						]		
_								_
-						-		-
-	13.5				Silty Sand (SM)		HI	SS-3 taken at 15:12
-		1.1	SS-3	5-6-8	13.5-14.6' - pale vellowish brown, (10YR 6/2), wet.	-		- 33-3 taken at 13.12
- 45	45.0	1.1	33-3	(14)	medium dense, 20-25% nonplastic fines, trace very fine sand-sized black particles, fine silica sand	<b>/</b>	Ш	-
15 <u> </u>	15.0				·	$\dashv$		
-	-					-		-
-						-		-
						]		
-								_
-	-					4		-
-	18.5						TI	SS-4 taken at 15:11
-	-	1.5	SS-4	7-10-9		-		
	20.0	1.5	33-4	(19)		-		-
20	20.0						111	
1								



PROJECT NUMBER:	BORING NUMBER:
338884.FL	GSC-11

SHEET 2 OF 10

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722723.7 N, 457915.1 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

DRILLING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8" drag bit ORIENTATION : Vertical

WATER	LEVELS	: 1.7 ft bo	gs on 2/1	1/07 S	START : 2/7/2007 END : 2/12/2007 LOGO	GER :	: T. Stewart, C. Sump				
				STANDARD	SOIL DESCRIPTION		G	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	7	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,			
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR		BOLI	DRILLING FLUID LOSS, TESTS, AND			
DEPT SURF ELEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTÁTION			
22.9 - - - -					Silty Sand (SM) 18.5-20.0' - medium dark gray mottled with pale yellowish brown, (N4 with 10YR 6/2), wet, medium dense, trace fine sand-sized black particles, 15-20% nonplastic fines, fine silica sand	  -  -  -  -		- - - -			
-	23.5				Silty Sand (SM) 23.5-25.0' - pale yellowish brown, (10YR 6/2), wet,	-					
25_ 17.9	25.0	1.5	SS-5	5-5-5 (10)	loose, 20-25% nonplastic fines, trace very fine sand-sized black particles, fine silica sand			-  -			
- - - -						-		- - - -			
_	28.5				Silty Sand (SM)	_	E DE	CC C taken at 15:40			
- 30	30.0	1.5	SS-6	6-5-3 (8)	28.5-30.0' - Same as 23.5-25.0' except trace black laminae	:		SS-6 taken at 15:43 - -			
12.9 - - - - -	00.5					-		- - - - -			
- - 35	33.5 35.0	1.5	SS-7	3-2-2 (4)	Silty Sand (SM) 33.5-35.0' - pale yellowish brown, (10YR 6/2), wet, very loose, 20% nonplastic fines, fine silica sand, trace fine black particles	-		SS-7 taken at 15:49 -			
7.9 - - - - - -	38.5				Silty Sand (SM)	-					
40	40.0	1.5	SS-8	4-5-3 (8)	38.5-40.0' - Same as 33.5-35.0' except loose						



PROJECT NUMBER:

338884.FL BORING NUMBER:

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# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722723.7 N, 457915.1 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

DRILLING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8" drag bit ORIENTATION : Vertical

WATER	LEVELS	: 1.7 ft bo	gs on 2/11	1/07 S	START : 2/7/2007					
				STANDARD	SOIL DESCRIPTION	Ţ,	COMMENTS			
LOW AND	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS						
A BE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	1 2	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION			
<u> 2.9</u>				(N)		+	0			
						+	-			
-						+	-			
-						+	-			
-						┨	-			
-						1	-			
-	43.5					1	-			
-	10.0				Clayey Sand (SC)		SS-9 taken at 16:01			
_		1.0	SS-9	6-6-8 (14)	43.5-44.5' - light bluish gray to light gray mottled with yellowish gray, (5B 7/1 to N7 with 5Y 8/1), wet,					
45	45.0			(14)	medium dense, 35-40% high plastic fines, trace fine	Ť				
-2.1					black particles, very fine to fine silica sand	]				
						]				
-						1	_			
_						1	_			
_						1	-			
-						1	-			
-	48.5				Silty Sand (SM)	+	SS-10 taken at 16:09			
-		4.0	00 10	2-2-3	$-\sqrt{48.5-49.0'}$ - palé yellowish brown, (10YR 6/2), wet,		33-10 taken at 10.09			
		1.3	SS-10	(5)	very loose, 30% low plastic fines, very fine to fine / silica sand		-			
50 -7.1	50.0				Clayey Sand (SC)	+	_			
-					\dagger 49.0-49.75' - dark gray, (N3), wet, loose, 30-35% medium plastic fines, very fine to fine silica sand	1	1			
-						1	-			
-						1	1			
						]				
-							Driller's Remark: 16:15 - 52.5' light rig chatter of drag bit			
_	53.5					1				
-				8-13-11	Silty Gravel With Sand (GM) 53.5-54.8' - medium dark gray, (N4), wet, medium	11	S-11 taken at 16:19			
-		1.3	SS-11	(24)	dense, no HCl reaction, fine to coarse angular gravel, appears to be calcite cemented, fine silica sands,	$ \cdot $	<b> </b> ∏			
55 <u> </u>	55.0				10-15% nonplastic fines, 20% very fine to fine silica	#	Driller's Remark: 16:27 switch to 3-7/8"			
'-''-					sand	+	tricone roller bit to continue drilling			
-						+	-			
-						+	-			
-						1	-			
-						1	1			
-	58.5					1	-			
-						1	SS-12 taken at 16:35			
		1.5	SS-12	3-2-3 (5)			7			
60	60.0			(5)		brack  brack	<u> </u>			
						T				
1										



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SHEET 4 OF 10

#### **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722723.7 N, 457915.1 E (NAD83)

DRILLING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8" drag bit

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

ORIENTATION: Vertical

WATER	LEVELS	: 1.7 ft b	gs on 2/1	1/07 5	TART : 2/7/2007 END : 2/12/2007 LOGGER : T. Stev	wart, C. Sump
				STANDARD	SOIL DESCRIPTION	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	AL (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	
표 있는		RECOVE	ERY (ft)	120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	INSTRUMENTATION
				(N)		
-17.1					Silty Sand (SM) 58.5-60.0' - grayish black to black, (N2 to N1), wet,	_
_					loose, 15-20% low plastic fines, organic soil (OH)	=
l _					lenses 9/16" thick (black [N1] high plasticity, slow dilatancy), very fine to fine silica sands	_
-						_
-						_
-					_	_
-	63.5					_
-				2-2-2	Interbedded Silty Sand And Organic Soil (SM-OH) 63.5-64.8' - Same as 58.5-60' except 80% silty sand	_
-		1.3	SS-13	(4)	and 20% organics	_
65	65.0					
-22.1					Er - be	nd drilling for 2/07/07 at 17:12 at 65.0' elow ground surface -
-					4 1	_
-					4 1	_
-					4 1	_
-					4 1	_
-					-	tout deilling on 0/0/07 at 00:00
-	68.5					tart drilling on 2/8/07 at 08:30
-				8-18-35	¬ 68.5-69.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.5-69.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.5-69.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.5-69.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.5-69.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2/1), wet, stiff,  ¬ 7 68.0' - brownish black, (5YR 2	riller's Remark: slightly firmer, but no natter –
-		1.5	SS-14	(53)	medium plasticity, slow dilatancy, laminated in sharp / -	-
70 <u> </u>	70.0				¬ Silt (ML)	-
-27.1					69.0-70.0' - grayish orange, (10YR 7/4), wet, hard, nonplastic to low plasticity, moderate HCI reaction,	-
-					laminated over entire interval with black organic beds /	-
-					(up to 1/16" thick), carbonate	-
-					- 1	-
-					- 1	-
-					- 1	-
-	73.5				Silt (ML)	S-15 taken at 08:55
-		1.5	SS-15	28-26-42	73.5-75.0' - Same as 69.0-70.0' except yellowish gray,	-
	75.0	'5	55-15	(68)	(5Y 7/2), wet, hard, low plasticity, rapid dilatancy, mild HCl reaction, 5-10% thinly bedded (3/16"-1-3/16"),	-
75 <u> </u>	75.0				¬ black (N1) organic layers, trace fine black (N1)  /	_
-					\organic particles in silt, carbonate / -	-
-					1 1	-
-					†	-
-					†	-
-					†	-
-	78.5				11	-
-	70.5	0.0	00.46	24-50/3	TIT S	S-16 taken at 09:13
-	79.3	0.8	SS-16	(74/9")		-
80					\	-
30_						



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722723.7 N, 457915.1 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

DRILLING METHOD AND EQUIPMENT: CME 550X S/N 340253, mud rotary, auto hammer, AWJ rods, 3-7/8" drag bit ORIENTATION: Vertical

						FND 0/40/2007			ONIENTATION : Vertical
WATER	LEVELS	: 1./ ft b	gs on 2/1		START : 2/7/2007	END : 2/12/2007 SOIL DESCRIPTION	LOGGEF	(: I.	Stewart, C. Sump  COMMENTS
<b>≯</b> Ω⊋1	044451	INITEDY	11 (4)	STANDARD PENETRATION					COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		TEST RESULTS	SOII NAM	ME, USCS GROUP SYMBOL	COLOR.	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H B ATIC		RECOVE	ERY (ft)		MOISTURI	RE CONTENT, RELATIVE DE	NSITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
LEV LEV			#TYPE	6"-6"-6" (N)	CONSISTEN	NCY, SOIL STRUCTURE, MI	NERALOGY	3YM	INSTRUMENTATION
-37.1				(14)	∖ Siltv Sand Wi	ith Limestone (SM)		0,	
-					\ 78.5-79.3' - ye	ellowish gray, (5Y 7/2), wet	, very dense,	1	-
-					plastic fines 2	tion, fine to coarse sand-si 25% fine to coarse gravel-s	zed, 25% low   _	┨	-
_					limestone frag	gments, 5% organics, carb	onate -	1	-
-							-	1	-
-							-		-
_							-		_
_	83. <u>5</u> 83.7	0.0	00 17	F0/0	Lima stana En				00.474-1
_			SS-17	50/2 (50/2")	Limestone Fra 83.5-83.7' - mo	ragments noderate yellowish brown, (	10YR 5/4),		SS-17 taken at 09:33
_				(===,	mild to modera	ate HCI reaction, two 1/4"	thick /_	]	Driller's Remark: Advised driller to begin coring, will use HQ coring assembly -
85	85.0					gments recovered			09:44 begin setting casing using 'devils head'
-42.1					No Recovery	85.0-90.0'	-		bit for 4" casing Resume drilling at 16:40
_							_		Tresume drilling at 10.40
							_		
							_		
		0.0	R1-HQ						R1: No run time recorded
		0.0					_		-
-							=		_
-							-	1	-
-							-	1	1
90	90.0 90.2	0.0	00.40	50/0	<u> </u>			Щ	- SS-18 taken at 16:45
-47.1	90.2	0.2	SS-18	50/2 (50/2")	Limestone Fra	<b>ragments</b> ellowish gray to moderate y	vellow (5Y 7/2 T	T '	00 10 takon at 10.10
-				(22)	\to 5Y 7/6), mile	ld HCI reaction		1	<del>-</del>
-					Begin Rock Co	Coring at 90.0 ft bgs sheet for the rock core log	-	1	-
-					Oce the next s	sheet for the rock core log	-	1	1
-							-	1	-
-							-	1	-
-							-	1	-
-							-	1	-
-							-	1	-
-							-	1	-
95 <u> </u>								1	-
							-	1	-
-							-	1	-
-							-	1	-
-							-	1	-
-							-		-
-							-		-
-							-		-
-							-		-
-							-		-
100									



PROJECT NUMBER: BORING NUMBER:

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# **ROCK CORE LOG**

SHEET 6 OF 11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722723.7 N, 457915.1 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

WATER	LEVELS : 1.7	ft bg	s on 2/	11/07 START : 2/7/2007 END : 2/	12/200	D7 LOGGER : T. Stewart, C. Sump			
>00	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
-47.1	90.0		>10		Ш	Limestone And Limestone	Start drilling R2-HQ with core barrel at 18:00		
- - - - - - - - -	R2-HQ 5 ft 20% 95.0	0	NR			Fragments 90.0-91.0' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), medium grained, weak to medium strong (R2 to R3), 40-50% voids (<1/16") over surface up to 1/16", unfilled dissolution cavities up to 3/8", highly competent, up to 15% black (N1) organic laminations and coarse-sized particles, limestone gravel is the same as the larger (2-1/2") fragments, strong HCI reaction on pulverized fragments No Recovery 91.0-95.0'	Driller will flush hole, then attempt to core again, the next core run will be R2-HQ  The order of samples is as follows: SS-17, R1-HQ, SS-18, R2-HQ Driller's Remark: Very little, if any circulation loss R2:3 minutes 18:15, last run of 2/8/07		
-52.1 -			>10	-	Щ	Limestone - 95.0-95.7' - yellowish gray to light	Start coring with NQ assembly at 15:50 on -		
-	R3-NQ 4 ft 18%	0	NR	- - - -		olive gray, (ŚY 7/2 to ŚY Ś/2), fine grained, weak to medium strong (R2 to R3), strong HCl reaction where pulverized, voids up to 1/16" over 50-70% of surface, strongly competent, fossiliferous (casts, molds up to 10%), trace medium grained black organics with moderate HCl reaction	assembly at 15:50 on 2/9/07 Driller's Remark: Hard drilling over 95.0-96.0' interval Recovery for R3-NQ is only limestone core fragments from 1-1/2"-2-1/2", last core run of 2/9/07, end drilling for 2/9/07 at 16:45		
-	99.0			-	Ш	No Recovery 95.7-99.0' Limestone	R3:15 minutes Start coring R4-NQ at		
100 -57.1 - - - - -	R4-NQ 5 ft 20%	0	>10 NR			99.0-100.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), moderate HCI reaction, weak to medium strong (R2 to R3), 20-30% voids up to 1/16" over surface, trace dissolution cavities up to 3/16" on surface, fragments up to 3-1/2", mostly fine to coarse gravel-sized fragments, trace organic (black) fragments as medium grained and 1/16"-sized laminations  No Recovery 100.0-104.0'	O9:05 on 2/10/07  Initial recovery from R4-NQ sample barrel is one 1" core fragment, recovery from NQ drill bit and casing is two larger fragments of core and gravel-sized pieces of limestone Driller's Remark: Switch of drill bit to NQ wireline bit Driller's Remark: It was		
-	104.0			-	H	-	discovered that a - conventional NQ drill bit		
105 -62.1 -62.1	R5-NQ 5 ft	28	1 104.5' - Fracture or bedding plane, horizontal, rough, undulating, tight 104.85, 105.0' - Mechanical break (2) 105.5' - Fracture, 30 deg, rough, undulating, dissolution cavities on the surface	rough, undulating, tight — 104.85, 105.0' - Mechanical break (2) 105.5' - Fracture, 30 deg, rough, undulating,		104.0-105.5' - yellowish gray to light olive gray, mottled slightly darker, (5Y 7/2 to 5Y 5/2), medium grained, strong HCl reaction, weak to medium strong (R2 to R3), highly competent rock, voids up to 1/8" over 25-35% of surface, few increasing with depth, many dissolution cavities up to	had been in use for the previous runs R4:10 minutes		
- - - - 110	109.0		3 1	108.3' - Fracture, 20 deg, rough, undulating, open, assumed not a mechanical break 108.45' - Fracture, horizontal, rough, undulating 108.5' - Fracture, 20 deg, rough, undulating		3/8"x3/4", oval-shaped, filled cavities with a very pale orange (10YR 8/2) filling, fossiliferous (moderately) molds and casts, trace organics as medium grained black particles No Recovery 105.5-108.3'	Driller's Remark: Soft zone at 107.0' for 1.0-1.5' - R5:11 minutes -		
110					Ħ				



PROJECT NUMBER: BORING NUMBER:

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## **ROCK CORE LOG**

SHEET 7 OF 11

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722723.7 N, 457915.1 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

WATER	LEVELS : 1.7	ft bgs	on 2	'11/07 START : 2/7/2007 END : 2/	12/20	07 LOGGER : T. Stewart, C. Sump			
≥∩≘	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
H BE	E RU STH, OVEF	(%) Q	TUF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD		
DEP SURF ELEV	COR	ROI	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMI	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.		
-67.1	-			109.15' - Fracture, horizontal, smooth,	İ	Limestone			
-			>10	undulating, open 1/2" 110.0-110.3' - Fracture zone, vertical and	Ш	- 109.0-113.1' - Same as 104.0-109.0' except many dissolution cavities	-		
-	R6-NQ			horizontal, tight	╁	1/8"x3/8", 15% voids <1/16" over	Driller's Remark: Loose		
-	5 ft 82%	56	>10	110.55' - Fracture, <5 deg, rough, undulating, tight	$\vdash$	<ul> <li>surface, light olive color (5Y 5/2) transitions to dusky yellow gray (5Y</li> </ul>	drilling at 111.0'		
			,	111.0-111.4' - Fracture zone, rock fragments 111.9' - Fracture, 20 deg, black stain, tight	H	6/4) mottled with light olive gray (5Y – 5/2)	1		
			1	112.85' - Fracture, 10 deg, smooth,	Ħ	- JiZ) -			
_			NR	undulating, no infill, black staining	Ħ	No Recovery 113.1-114.0'	R6:4 minutes		
_	114.0		INIX	<u>-</u>	H		_		
-			3	114 E' Machanical brook berizontal	世	Limestone - 114.0-119.0' - mottled pale yellowish	-		
115 <u> </u>				114.5' - Mechanical break, horizontal, smooth, undulating, tight —	L	orange and light olive gray, (10YR 8/6 and 5Y 5/2), fine to medium	-		
-			>10	114.6' - Fracture, <5 deg, smooth, undulating, black staining, open 1/2"	Н	<ul> <li>grained, moderate HCl reaction,</li> </ul>	-		
-	R7-NQ			114.8' - Fracture, 40 deg, rough, undulating, on staining, open, top of fractured zone at	H	weak to medium strong (R2 to R3), strongly cemented, 40-50% voids up	-		
-	5 ft 100%	30	3	114.8-115.7'	F	<ul> <li>to 1/16" over rock surface, poorly fossiliferous (casts), &lt;1% fine to</li> </ul>	-		
-	100 /6			116.0' - Mechanical break, horizontal, rough, - undulating, tight	ᄪ	medium grained black particles	-		
-			4	116.2' - Fracture, vertical, rough, undulating,		-	†		
_			1	black staining, open 116.55' - Fracture, <5 deg, rough, undulating,		-	R7:6 minutes		
	119.0		1	stains over 1/4" 116.8' - Mechanical break, horizontal,					
_			1	smooth, planar, open 1/8"		119.0-121.4' - mottled pale yellowish orange and medium gray and light			
120_				117.0, 117.25, 117.45' - Mechanical break (3) 117.85' - Fracture, 70 deg, rough, undulating —	$\perp$	olive gray, (10YR 8/6 and N5 and 5Y	_		
-77.1 -			>10	>10	118.1' - Fracture, horizontal, smooth, undulating, open	$\Box$	5/2), fine to medium grained, weak to - medium strong (R2 to R3), strong	-	
-	R8-NQ				>10	>10	118.2' - Fracture, <5 deg, rough, undulating,	H	HCl reaction on light colored areas, moderate HCl reaction on darker
-	5 ft	20		open 3/8" 118.6-118.7' - Fracture zone or mechanical	$\vdash$	<ul> <li>colored areas, strongly competent,</li> </ul>	122.5' soft -		
-	48%			break 119.1' - Mechanical break, along bedding	F	20-30% voids 1/16"x1/16", 5-10% dissolution cavities 1/8"x1/16", poorly	-		
-			NR	plane from drilling	Ħ	<ul> <li>to moderately fossiliferous, casts, 1" section at top is moderate olive</li> </ul>	Driller's Remark: Slightly		
-				119.5, 119.6' - Fracture (2), horizontal, rough, undulating, open	Ħ	brown (5Y 4/4) and moderately to	harder drilling at 122.5' - R8:6 minutes		
-	124.0			119.9' - Fracture, horizontal, rough, planar, open	Ħ	<ul> <li>highly fossiliferous (casts)</li> <li>No Recovery 121.4-124.0'</li> </ul>	Driller's Remark: 123.5'		
_			<b>&gt;10</b>	120.05-121.0' - Fracture zone, rough,	世	Limestone	slipped down - Started R9-NQ at 14:27		
125			>10	undulating, open 124.0-124.6' - Fracture zone		<ul> <li>124.0-124.6' - yellowish gray, (5Y</li> <li>7/2), medium grained, strong HCl</li> </ul>	_]		
-82.1			1	124.6' - Mechanical break, horizontal 125.1' - Fracture, <5 deg, rough, undulating,	片	reaction, very weak (R1), weakly to - moderately competent, voids	Driller's Remark: Soft at 124.0-127.0'		
_				open	世	(<1/16") over 75% of surface, 40%	-		
_	R9-NQ 5 ft	31	3	126.15' - Bedding plane, rough, stepped,	H	fine to medium grained black (N1) particles	_		
-	48%			126.25' - Fracture, horizontal, rough,	H	124.6-126.4' - light olive brown and moderate olive brown, (5Y 5/6 and	-		
-			NR	undulating, open 1/4" 126.4' - Fracture, horizontal, rough,	$\vdash$	<ul> <li>5Y 4/4), fine grained, moderate HCl</li> </ul>	-		
-			1411	undulating, open	厈	reaction, weak to medium strong (R2 to R3), moderately to highly	R9:3 minutes		
-	120.0			-	口	<ul> <li>fossiliferous (many casts, trace molds), white crystal as partial infill in</li> </ul>	-		
-	129.0			129.0-130.8' - Fracture zone	世	cavities (with mild to moderate HCl	-		
130			>10	<del>-</del>	世	<pre>reaction) No Recovery 126.4-129.0'</pre>			
					1	-			



FRACTURES PER FOOT

>10

0

NR

1

>10

>10

0

NR

>10

1

NR

3

>10

4

2

2

NR

>10

40

RQD(%)

26 0

WATER LEVELS: 1.7 ft bgs on 2/11/07

CORE RUN, LENGTH, AND RECOVERY (%)

R10-NO

5 ft

74%

R11-NQ

5 ft 30

66%

R12-NQ

30%

R13-NC

5 ft 86%

0 5 ft

134 0

139.0

144.0

149.0

DEPTH BELOW SURFACE AND ELEVATION (ft)

-87.1

135\_

-92 T

140

-97.1

145

-102.1

150

BORING NUMBER: PROJECT NUMBER: 338884.FL **GSC-11** SHEET 8 OF 11

END: 2/12/2007

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#### ROCK CORE LOG

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1722723.7 N, 457915.1 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

CORING METHOD AND EQUIPMENT : CME 550X S/N 340253, mud rotary, HQ/NQ tools, HW casing START: 2/7/2007

DESCRIPTION

DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND

THICKNESS, SURFACE STAINING, AND TIGHTNESS

131.0' - Fracture, 60 deg, rough, undulating,

131.65' - Fracture, 40 deg, rough, undulating,

132.3' - Fracture, <5 deg, rough, undulating, open, fractured from 132.3-132.7'

134.1' - Fracture. <5 deg. rough, undulating.

136.15' - Fracture, <5 deg, rough, undulating, top of fractured zone 136.15-136.8',

mechanical breaks to 1-1/2" fragments

137.05' - Fracture, vertical, slickensided,

137.3' - Fracture, <5 deg, rough, undulating,

139.25' - Bedding plane, horizontal, rough, planar, open 1/8", top of fractured zone of

140.3' - Fracture, <5 deg, rough, undulating

144.4' - Fracture, 10 deg, rough, undulating,

144.6, 144.9' - Fracture (2), <5 deg, rough,

145.6' - Fracture, <5 deg, grayish brown

(5YR 3/2) stain, tight, 1/8" 145.75-146.2' - Fracture zone, limestone

146.4' - Bedding plane, horizontal, smooth, undulating, organic infill, tight 146.65, 146.8' - Mechanical break (2) 147.1, 147.35' - Fracture (2), horizontal,

146.2' - Mechanical break, tight

smooth, planar, open 1/2'

145.2, 145.4' - Fracture (2), horizontal, rough,

more friable material, 139.25-139.9'

139.25, 139.9' - Mechanical break (2) 140.1' - Fracture, 50 deg, smooth, undulating

136.8' - Mechanical break, horizontal

135.0' - Fracture, horizontal, rough,

135.0-135.4' - Mechanical break

136.9' - Mechanical break

mechanical breaks

DISCONTINUITIES

130.8' - Fracture, horizontal, rough,

undulating, tight

tight

open 1-1/2"

stepped

open

open

undulating, open

undulating, open 1/4"

gravel up to 1"x1/2"

undulating, open

ORIENTATION: Vertical LOGGER: T. Stewart, C. Sump LITHOLOGY COMMENTS ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS Limestone Consistent medium drilling 129.0-132.7' - Same as 124.6-126.4' R10:4 minutes No Recovery 132.72-134.0' Limestone 134.0-137.3' - Same as 124.6-126.4' except 25% oblong-shaped dissolution cavities (up to 1/4"x1/8"), stronger rock at 135.0-135.5' and 136 3-137 3' Driller's Remark: Soft at No Recovery 137.3-139.0' 137 0-138 0 R11:4 minutes Limestone 139.0-139.9' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), fine grained, mild to moderate HCl Driller's Remark: Very soft reaction, medium strong (R3), trace from 141 5-143 5' bedding, voids <1/16" over 10-15% surface on stronger intervals, up to 45% on more friable intervals, 10-15% black possible organics 139.9-140.5' - very pale orange mottled medium gray, (10YR 8/2 mottled N5), very fine grained, strong HCl reaction, weak to medium strong R12:3 minutes (R2 to R3), bioturbated, moderately to highly fossiliferous (mostly casts, many molds) up to 1-3/8' Start R13-NQ at 16:09, No Recovery 140.5-144.0' ended at 16:14 Limestone 144.0-146.2' - Same as 139.9-140.5' Driller's Remark: 146.5except less mottling, highly 147.5' were alternating soft bioturbated, trace very fine to fine organic particles in bioturbated zones to medium drilling 146.2-148.3' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), laminated light olive gray (5Y Driller's Remark: Hard at 5/2), bioturbated zone at 147.2' (1/2" thick) with voids <1/16" 147.5 R13:5 minutes No Recovery 148.3-149.0' Limestone

149.0-149.5' - Same as 146.2-148.3'



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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722723.7 N, 457915.1 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

WATER	LEVELS: 1.7	ft bgs	s on 2	11/07 START : 2/7/2007 END : 2	12/20	D7 LOGGER : T. Stewart, C. Sump	
30₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
BELO SE AN TON (f	CUN, H, AND ERY (6	(%	JRES	DESCRIPTION	- IIC FC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-107.1	03#			148.3' - Fracture, horizontal, rough,		Limestone	Measured depth of water at
_			3	undulating, open 149.0-149.35' - Fracture zone, limestone	Ħ	- 149.5-151.9' - light olive brown to light olive gray, (5Y 5/6 to 5Y 5/2),	1.7' below ground surface – on 2/11/07 at 08:30
-	R14-NQ 5 ft	37	5	gravel-sized fragments to 3/4"x1" 149.35' - Fracture, horizontal, rough,	$\blacksquare$	fine grained, moderate HCl reaction, weak to medium strong (R2 to R3),	-
-	86%			undulating, open 149.5' - Fracture, horizontal, rough,	$\Box$	poorly fossiliferous (casts), trace voids up to 1/8" - 151.9-153.3' - Same as 146.2-148.3'	-
_			0	undulating, open 3/16" 149.75' - Fracture, horizontal, rough, undulating, tight	井	- 131.9-133.3 - Same as 140.2-140.3	D44.7 minutes
-	454.0		NR	149.9' - Fracture, horizontal, rough, undulating, open, top of fracture zone	揊	- No Recovery 153.3-154.0'	R14:7 minutes
-	154.0		1	149.9-150.2' - Fracture zone, rock fragments to 1"x 1"	$\blacksquare$	Limestone	-
155 -112.1			'	150.2' - Fracture, horizontal, rough, undulating, tight to open 1/8"	F	- 154.0-157.2' - moderate yellow to dusky yellow, (5Y 7/6 to 5Y 6/4), fine	
-112.1			1	150.3, 150.35, 150.72, 151.0, 151.25, 151.6, 151.75, 151.9' - Fractures (8), horizontal,	$\blacksquare$	to medium grained, strong HCI  reaction, weak to medium strong (R2 to R3), ripple laminated in light olive	-
-	R15-NQ 5 ft	18	1	rough, undulating, tight 153.3' - Fracture, horizontal, rough,	丗	gray (5Y 5/2), alternating parallel intervals of bioturbation, voids up to	_
_	76%	10		undulating 154.5' - Fracture, horizontal, rough, planar,	Ħ	1/16" over 5-10% of surface	_
-			2	tight 154.6-155.1' - Fracture zone	$\blacksquare$	_ 157.2-157.8' - olive gray, (5Y 3/2), medium grained, moderate HCl	-
_			NR	155.5' - Fracture, 80 deg, slickensided, stepped, brown staining, tight	世	reaction, weak to medium strong (R2 to R3), voids <1/16" on 50-70% of	R15:5 minutes
-	159.0			156.85, 157.0, 157.6' - Fractures (3), horizontal, rough, undulating, open	$\blacksquare$	surface, trace dusky yellow (5Y 6/4)  discoloration	-
160			2	159.4, 159.5' - Fractures (2), rough,	oxplus	No Recovery 157.8-159.0' Limestone	-
-117.1			1	undulating, open 1/8"	#	— 159.0-162.5' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y	
-	R16-NQ		·	160.9, 161.0, 161.1' - Bedding plane (3), <5	由	4/4), fine to medium grained,  moderate to strong HCl reaction,	_
-	5 ft   92%	56	7	deg, rough, undulating, tight 161.2, 161.3' - Fracture or mechanical break	$\perp$	weak to medium strong (R2 to R3), voids (<1/16") over 30-40% of	-
_			5	(2), horizontal, rough, undulating, tight 161.5, 161.6, 161.7, 162.0, 162.1, 162.2' -	丼	- surface, dissolution cavities up to 3/8"x3/4" on 5% of surface, white	
-				Bedding plane (4), horizontal, rough, planar, tight	E	mineral infill, some cavities  162.5-163.6' - very pale orange and	R16: No run time recorded
-	164.0		0 NR	162.6' - Bedding plane, horizontal, rough, undulating	$\coprod$	mottled medium light gray, (10YR 8/2 and N6), strong HCl reaction, weak	-
-				162.7, 163.0' - Mechanical break (2) 163.45' - Fracture, horizontal, rough,	]#	<ul> <li>to medium strong (R2 to R3), highly fossiliferous (very small &lt;1/16" molds/casts)</li> </ul>	Driller's Remark: Driller switch to HQ core -
165 -122.1	R17-HQ 2 ft	0	NR	undulating, tight, open 1/8"  -	扭	— No Recovery 163.6-164.0' No Recovery 164.0-166.0'	assembly and used a 2.0' stake on core run
-	0% 166.0				丗	- 140 (1600 very 10-10-100.0	R17:1 minute -
-			2		H	Limestone - 166.0-166.9' - moderate olive brown	]
-				166.65' - Bedding plane, horizontal, rough, undulating, open	日	and light olive gray, (5Y 4/4 and 5Y 6/1), fine grained, strong HCl	-
_			>10	166.9' - Bedding plane, horizontal, smooth, planar, open	╁┼	<ul> <li>reaction, strong (R4), 30-40%</li> <li>medium grained medium gray (N5)</li> </ul>	]
-	R18-HQ 5 ft	16	>10	166.9-171.0' - Mechanical break, horizontal, smooth, planar, highly competent limestone		particles, poorly fossiliferous (few casts), laminations at 166.0'	]
-	70%		>10	intervals, related to drilling	田	_	-
170					囯	-	-
							1



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722723.7 N, 457915.1 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

WATER	LEVELS : 1.7	ft bgs	s on 2	/11/07 START : 2/7/2007 END : 2/	12/2	2007	LOGGER : T. Stewart, C. Sump	
≥∩ ∷	(9)			DISCONTINUITIES	ي	ے ر	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	3 <b>[</b>	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	E RU STH, OVEF	(%) Q	TUF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	Ž	3	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	SORI	ROI	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	N X		AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-127.1	034		NR		٠,		Limestone	R18: No run time recorded
-	474.0		IVIX	-	Н	+	166.9-169.5' - moderate olive brown,	-
-	171.0			-	F	7	(5Y 4/4), medium to coarse grained, strong HCl reaction, weak (R2),	-
-			1	-	Ħ	#	5-10% powder white mineral infill in voids and cavities, 166.9-167.2' and	1
-				171.7' - Mechanical break, horizontal, undulating, 1/4" x 5/16" relief, fossil molds	Ľ	#	167.6-168.0' is olive gray (5Y 6/1),	-
_			3	exposed on surface 172.2' - Fracture, horizontal, smooth,	H	낰	fine matrix, microlaminated No Recovery 169.5-171.0'	1
-	R19-HQ	56		undulating	Η	4	Limestone	1
_	5 ft 100%		2	172.4' - Fracture or mechanical break, <5 - deg	Ρ	4	171.0-171.9' - yellowish gray, (5Y 7/2), medium to coarse grained,	1
_	1,00%			172.5, 172.9, 173.6' - Bedding plane (3),	Þ	ヸ	strong HCl reaction, weak to medium strong (R2 to R3), 10-20%	1
175			2	horizontal, rough, undulating, open 3/16" 174.1' - Mechanical break or fracture, 70 deg,	Ъ	₵	dissolution cavities up to 9/16"x3/8",	
-132.1			2	rough, undulating 175.1' - Mechanical break, horizontal, rough,	Ь	₫	up to 35% medium gray (N5) coarse-sized grains, poorly	R19:8 minutes
	176.0			undulating, irregular	Ь	$\mathbf{d}$	fossiliferous (trace casts), sharp	]
_			2	175.3' - Mechanical break, horizontal, rough, undulating	Ь	H	contact 171.9-176.0' - yellowish gray, (5Y	
_			_	175.4' - Bedding plane, horizontal, rough,	F	7	7/2), fine to medium grained, moderate HCl reaction, weak to	
_			4	undulating, open 1/8"x3/16" 176.4-176.6' - Fracture, horizontal, rough,	Ľ	#	medium strong (R2 to R3), very	_
_				clay/gravel interbed, clay infill 177.0, 177.1' - Fractures (2), horizontal,	Ľ	#	poorly fossiliferous (trace casts), fine bedding laminations (1/16"x3/16")	_
_	R20-HQ 5 ft 96%	32	1	rough, undulating, clay infill	Ľ	╬	visible on fresh broken face	-
-				177.8' - Fracture or mechanical break, 70 deg, rough, undulating, closely spaced	H	4	176.0-180.8' - Same as 171.9-176.0' except rippled laminations are visible	-
-			7	fracture	Н	4	over 179.0-180.5'	-
180_ -137.1				178.6' - Fracture, 45 deg, rough, undulating 179.0' - Mechanical break, horizontal, rough,	₽	4	_	R20: No run time recorded —
-			5	undulating 179.2, 179.3, 179.35' - Bedding plane (3),	卩	┖┞		-
-	181.0		NR.	horizontal, rough, planar to undulating	廿	╬	No Recovery 180.8-181.0' Limestone	-
-			4	179.6' - Mechanical break, 10-15 deg, clean, tight	Ь	╅	181.0-185.0' - Same as 171.9-176.0'	-
-				179.7, 179.85' - Fracture (2), horizontal,	H	╁		-
-			3	rough, planar, dark brown staining 180.0' - Mechanical break, 0-5 deg,	F	7		-
-	R21-HQ			undulating, clean 180.1, 180.3' - Bedding plane (2), horizontal,	F	7		1
_	5 ft 90%	48	0	rough, brown staining	Ħ	Ħ		1
_			6	180.6, 180.7' - Fractures (2), horizontal, rough, undulating, slight staining, no infill	Ľ	#		1
185			Ö	181.2' - Fracture, fragmented limestone	Ľ		_	
-142.1			5	181.5, 181.6, 181.7' - Fracture (3), — fragmented limestone, horizontal planar	H	£	_ Limestone	R21: No run time recorded
_	186.0		NR	breaks  ☐ 182.0' - Bedding plane, horizontal, rough, ☐	E	Ц,	185.3-185.5' - dark brown,	
_				planar, slight brown staining on fracture	1	L	fossiliferous surface, voids on >60% of surface, molds and casts	
_				182.5' - Fracture, rough, horizontal partings, cavity-rich limestone breaks (fragmented)	1	L	No Recovery 185.5-186.0'	_
_				182.7' - Fracture, rough, irregular break 184.0' - Bedding plane, horizontal, smooth	1	F	Bottom of Boring at 186.0 ft bgs on 2/12/2007	-
-				184.05, 184.45, 184.50, 184.6' - Bedding -	-	ŀ		
-				plane (4), horizontal, smooth 184.95, 185.0, 185.05, 185.1' - Bedding plane	-	ŀ		-
-				(4), horizontal, smooth, fine spaced	┨	-		-
-				(3/8"x7/8")	┨	-		-
-					╁	+		



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722723.7 N, 457915.1 E (NAD83)

ELEVATION: 42.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Orlando, FL; Driller: D. Patten

				ILIVI : CIVIL 330X 3/IV 340233, Iliud Iotaly,	,		ouog		ONENTATION: Vertical
WATER	LEVELS: 1.7	ft bgs	on 2/	/11/07 START : 2/7/2007	END : 2/1	2/20	07	LOGGER: T. Stewart, C. Sump	
				DISCONTINUITIES		,_		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)					SYMBOLIC LOG			
N A E	₹AΣ	_	FRACTURES PER FOOT	DESCRIPTION		C		ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
	S 두류	(%) Q	28	DEPTH TYPE ORIENTATION ROLLS	HNESS	딩		WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
₹₩\$	RE 200	۵	S F	DEPTH, TYPE, ORIENTATION, ROUG PLANARITY, INFILLING MATERIAL	AND	Æ		AND ROCK MASS	SMOOTHNESS, CAVING ROD
SCIE	S H N	a a	FF	THICKNESS, SURFACE STAINING, AND 1	TIGHTNESS	SYI		CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
		_		185.3' - discontinuity with much more		H			
				void/fossil-rich limestone, dark browr			L		_
				color	/yellow   -				
1 -				185.5' - end of run	-	1	-		1
I -				100.0 0114 01 1411			_		_
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722835.8 N, 458289.6 E (NAD83)

ELEVATION: 41.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-7/8" tri-cone bit ORIENTATION : Vertical

					100073, mud rotary, cathead, NW rod			ONIENTATION: Vertical
WATER	LEVELS	: 3.5 ft b	gs on 05/	17/2007 S	ART : 5/16/2007 END : 5/19/2		R : C.	Wallested
<b>                   </b>				STANDARD PENETRATION	SOIL DESCRIPTI	UN	ď	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOIL NAME, USCS GROUP SY	MPOL COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
A S E		RECOVE	ERY (ft)		MOISTURE CONTENT, RELAT		l o	DRILLING FLUID LOSS, TESTS, AND
PT.			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTU	RE, MINERALOGY	₩	INSTRUMENTÁTION
				(N)	<del>-</del> -		S)	
41.0	0.0			1-3-3	<b>Topsoil</b> ∖0.0-0.2'	/		]
l _		1.2	SS-1	(6)	Poorly Graded Sand (SP)			]
	1.5			` ,	0.2-1.15' - grayish orange to mode		<b>T</b>	1
					brown, (10YR 7/4 to 10YR 5/4), monplastic fines, trace organics, fines			
					(		1	1
							1	1
_							1	Driller's Remark: Material at 5.0-5.65' started
-							1	at 3.0' below ground surface -
-							1	1
							-	-
5 36.0	5.0				Clayey Sand (SC)	_	1//	<del>,</del>
-		0.7	000	3-3-3	5.0-5.65' - light olive gray, (5Y 6/1	), moist, loose, very	<b>-</b>  ///	4
-		0.7	SS-2	(6)	fine to fine silica sand, 40-45% high		-	-
-	6.5				trace fine graver (possible concret		4	
_							4	
_							4	_
_							_	
_							_	]
							1	1
10	10.0						1	1
31.0	10.0				Silty Limestone Gravel With San		1	Driller's Remark: Lost circulation at 10.0'
-		0.4	SS-3	3-13-6	10.0-10.4' - yellowish gray, (5Y 8/4 dense, strong HCl reaction, fine to		T	below ground surface - Driller mixed thick mud, regain circulation
-	11.5			(19)	gravel-sized limestone, composed	d of mostly (<75%)	1	Briller mixed trick mad, regain circulation
-	11.5				fossil cast and molds (possible sh 35-40% fine to coarse sand sized	ell hash coquina),	1	1
-					limestone), 15% nonplastic to low		1	-
-					carbonate material	•	-	
-							-	-
-							-	-
_							-	
-							1	
15	15.0				All: 11	1.010		,
26.0		0.8	SS-4	32-50/4.5	Silty Limestone Gravel With San 15.0-15.8' - Same as 10.0-10.4' ex	d (GM)	<u> </u>   [	
	15.9		-	(82/10.5")	fossiliferous with 3/4"x3/16" size of	asts over 10-15% of /	<u> </u>	Driller's Remark: Light chattering at 15.8'
					the rock surface, light olive brown some face	(5Y 5/6) staining on		below ground surface
]					Some race		1	1
							1	] 1
-							1	1
-							1	1
-							1	-
-							1	-
							1	
20							+	
		l .	l .					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-12	SHEET	2	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722835.8 N, 458289.6 E (NAD83)

ELEVATION: 41.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-7/8" tri-cone bit ORIENTATION : Vertical

WATER LEVELS: 3.5 ft bgs on 05/17/2007				17/2007	START : 5/16/2007	END: 5/19/2007	LOGGER	: C.	Wallested
				STANDARD	So	OIL DESCRIPTION		c.	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				SYMBOLIC LOG	
표원인		RECOVE	RY (ft)	120111200210		SCS GROUP SYMBOL, COLO NTENT, RELATIVE DENSITY		OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH EVA			#TYPE	6"-6"-6"		SOIL STRUCTURE, MINERAL		MBC	INSTRUMENTATION
SU				(N)				Sγ	
21.0	20.0				Silty Sand (SM)	rish gray, (5Y 8/1), wet, med	lium		
		1.2	SS-5	8-12-12 (24)	dense, very fine to	fine silica sand, trace fine			
	21.5			(= :)		% nonplastic fines, modera	te HCl	111	_
					fat clay at bottom of	te material, 1" thick bed of s f sample	sandy / -		_
_	1				(4.1.5.4) 4.1.55.10.11.5				-
-	1						-		-
-	1						=		-
-	1						-		-
-	-						=		-
	1						-		-
25 16.0	25.0				Sandy Silt (ML)			Ш	
-	-		00.0	5-4-19	25.0-26.15' - yellow	rish gray, (5Y 8/1), wet, very	stiff, -		-
-	-	1.5	SS-6	(23)	low plasticity, rapid	dilatancy, strong HCI reacticarbonate sand, 1" thick da	on,	Ш	-
_	26.5				¬     ¬ greenish gray (5GY)	4/1) and 2-1/2" thick dark	<i> </i>	Ш	-
-	-				yellowish orange (1 and 25.95' respective	0YR 6/6) fat clay lenses at 2	25.0'   _		-
-					Silt (ML)	very	/ -		-
-	1				26.15-26.5' - very p	ale orange, (10YR 8/2), wet	t, very		_
_	_				stiff, low plasticity, r HCl reaction, carbo	rapid dilatancy, moderate to	strong		_
l _					10.1000.01,00.00	nato matorial			_
1 _	]								
30	30.0								
11.0		0.7	SS-7	46-50/5.5		mestone Fragments (ML) orange, (10YR 7/4), wet, ha	ord		
	31.0	0.7	33-7	(96/11.5")	nonplastic, rapid dil	atancy, moderate HCI react	tion, /	ш	
-					\ 25% fine to coarse	sand sized, 10-15% fine gra	avel / $\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $		_
-	1				sized ilmestone fraç	gments, carbonate material			_
_	1						_		_
_	1						=		-
-	1						-		-
1 -	1						-		-
1 -	†						-		-
	05.0						-		-
35 6.0	35.0				Sandy Silt And Lin	nestone (ML)		Ш	
-	-	0.8	SS-8	5-9-16	35.0-35.8' - Same a	as 30.0-30.7' except yellowis	sh gray, -		-
-	ł	0.0	33-0	(25)	(5Y 7/2), very stiff,	1-1/4" limestone fragments			-
-	36.5						_		Driller's Remark: 36.5' below ground surface:
-	-						-		hard rock -
-	-						-		-
-	-						_		-
-							-		-
-	-						_		_
-							=		_
40									



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722835.8 N, 458289.6 E (NAD83)

ELEVATION: 41.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT: CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-7/8" tri-cone bit

ORIENTATION: Vertical WATER LEVELS: 3.5 ft bgs on 05/17/2007 LOGGER: C. Wallested START: 5/16/2007 END: 5/19/2007 SOIL DESCRIPTION COMMENTS STANDARD LOG PENETRATION TEST RESULTS SAMPLE INTERVAL (ft) DEPTH BELO SURFACE AN ELEVATION ( SYMBOLIC SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, RECOVERY (ft) MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND CONSISTENCY, SOIL STRUCTURE, MINERALOGY INSTRUMENTATION 6"-6"-6" #TYPF (N) Silt With Sand And Limestone (ML) Driller's Remark: Lost 100 % circulation at 40.0 40.0-40.9' - dusky yellow, (5Y 6/4), moist, hard, 40.0' below ground surface; mixed thick mud 15-22-41 SS-9 0.9 nonplastic, rapid dilatancy, moderate HCI reaction, 20-25% fine to coarse sand-sized, 10% fine to coarse and regained circulation (63)41.5 gravel-sized limestone fragments, carbonate material, dark (possible organic) 1/4" thick layer at 40.45', yellowish gray (5Y 8/1) limestone fragment at top of sample (similar to SS-3 and SS-4) 45 45.0 -4.Ō Silt With Sand (ML) 45.0-46.2' - yellowish gray, (5Y 7/2), wet, hard, low 14-15-26 1.2 SS-10 plasticity, rapid dilatancy, moderate to strong HCl (41)reaction, 20% fine to coarse sand-sized, trace fine 46.5 gravel-sized limestone fragments, carbonate material 50.0 50 -9.0 Limestone Fragments 50.0-50.2' - moderate yellowish brown, (10YR 5/4), 22-18-23 1.3 SS-11 moderate HCI reaction (41)Silt With Sand (ML) 51.5 Silt With Sarid (ML) 50.2-51.3' - moderate yellowish brown, (10YR 5/4), wet, hard, low plasticity, rapid dilatancy, strong HCl reaction, 20% fine to coarse sand-sized, trace fine gravel-sized limestone fragments, dark (possible organic), 1/4" thick layer at 50.8' 55 55.0 -14.0 Silt With Sand (ML) 55.0-56.5' - Same as 50.2-51.3' except increase in 34-39-49 SS-12 1.5 fine gravel-sized limestone with depth to 10%, trace (88)dark (possible organic) mottling 56.5 Driller's Remark: End of drilling at 56.5' below ground surface on 5/16/07 at 17:00 On 5/17/07 at 08:03, water level is at 3.5' below ground surface; at 08:15, begin cleaning hole and circulating mud 60



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722835.8 N, 458289.6 E (NAD83)

ELEVATION: 41.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-7/8" tri-cone bit ORIENTATION : Vertical

WATER	ATER LEVELS: 3.5 ft bgs on 05/17/2007 START: 5/16/2007 END: 5/19/2007 LOGGER: C. Wallested											
				STANDARD	SOIL DESCRIPTION COMMENTS							
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	RECOVE		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY							
DEPTI SURF/			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY							
-19.0 -	60.0	1.4	SS-13	24-27-38 (65)	Silt With Sand (ML) 60.0-61.4' - Same as 50.2-51.3' except dark yellowish orange, (10YR 6/6), dark organic layers at 60.8', 61.15', and 61.25'							
-												
65 -24.0 - - -	65.0	1.3	SS-14	41-47-45 (92)	Sandy Silt (ML) 65.0-66.3' - Same as 50.2-51.3' except grayish orange, (10YR 7/4), 30-35% fine to coarse sand-sized limestone, trace dark (possible organic) mottling throughout							
- - - - 70	70.0				Driller's Remark: Increase in hardness of material at 68.0' below ground surface							
-29.0 - - - -	70.0	0.1	SS-15	50/3 (50/3")	Limestone Fragments 70.0-70.1' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction							
- - - 75_ -34.0	75.0 75.1	0.1	SS-16)	50/2 (FO(7!))	Limestone Fragments							
-				(50/2")	\[ \frac{75.0-75.05' - Same as 70.0-70.1'}{Begin Rock Coring at 75.0 ft bgs} \] See the next sheet for the rock core log							
- - - 80												



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722835.8 N, 458289.6 E (NAD83)

ELEVATION: 41.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

ORIENTATION: Vertical

CORING	IVIL IT IOD A	ND E	אורוע	IENT: CME 550 S/N 186073, mud rotary, NQ tools, HW	Casin	<u>y</u>	ORIENTATION : Vertical				
WATER	LEVELS: 3.5	ft bg	s on 0	5/17/2007 START : 5/16/2007 END : 5/	19/20	07 LOGGER : C. Wallested					
				DISCONTINUITIES	T.,	LITHOLOGY	COMMENTS				
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		·	DESCRIPTION	F00						
O A A	R,A,R	_	FRACTURES PER FOOT	DESCRIPTION	⊒	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,				
AACI	SE E	(%) <sub>Q</sub>		DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND				
FF 문짓	N S S S S S S S S S S S S S S S S S S S	οD	AC ER F	PLANARITY, INFILLING MATERIAL AND	₹	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.				
2 2 3 I	822	ď	FH	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	BROT 6, 1201 REGGET6, 216.				
-34.0	75.0			75.15, 78.15, 78.55, 78.65, 78.8' - Bedding		Limestone	Begin rock coring at 75'				
-			4	plane (5), horizontal, smooth, undulating,	╁	- 75.0-79.4' - moderate yellowish	_				
-				tight	Ł	brown, (10YR 5/4), fine to medium	_				
l _			3	75.6' - Bedding plane or mechanical break,	$\perp$	grained, moderate to strong HCl reaction, extremely weak to weak	_				
				10 deg, smooth, undulating, open 1/2"	Н	(R0 to R2), up to 1/8" voids cover					
-	R1-NQ			75.7' - Fracture, 80 deg, smooth, undulating, tight		15-40% of surface, up to 3/16"x3/8"	_				
-	5 ft	43	2	75.95' - Bedding plane, horizontal, smooth,	╨	- fossil casts, up to 3/16" thick dark	-				
_	88%			planar, tight	╂┰	(possible organic) lamination, voids cover 40% of surface below 78.3'	_				
_			4	76.1' - Fracture, vertical, smooth, undulating,		- with trace grayish hard infill to 9/16"					
			-	tight, vertical from 75.6-76.55' 76.55' - Bedding plane, horizontal, smooth,	$\vdash$	diameter, trace <9/16" cavities					
_			0	undulating, tight	Ш	throughout the core	R1:7 minutes				
			NR	76.85' - Mechanical break or fracture, 40 deg,	╁	- No Recovery 79.4-80.0'	-				
-39.0	80.0		1411	smooth, undulating, tight	╀	L:	-				
-39.0			>10	77.2' - Fracture, 70 deg, smooth, undulating,	ш	<b>Limestone</b> - 80.0-81.25' - Same as 75.0-79.4'	]				
			10	tight 77.35' - Fracture, 30 deg, smooth, undulating,	$\vdash$	except 3/4" thick brownish black					
1 -			>1	tight	亡	(5YR 2/1) fat clay at 80.25-80.3'	1				
-				80.0-80.25' - Fracture zone, fragments to	0.0-80.25' - Fracture zone, fragments to No Recovery 81.25-85.0'						
-	DO NO			1"x1-1/2"	╂┰	-	_				
_	R2-NQ 5 ft	10		80.25-80.3' - Clay seam, clay layer or infill 80.3' - Bedding plane, horizontal, smooth,		_					
	25%			planar, in contact with clay layer or infill	Н						
			NR	80.55' - Mechanical break or bedding plane,		_					
-				horizontal, smooth, stepped, tight	╁	-	-				
-				81.0-81.25' - Fracture zone, fragments to 1-3/4"x2"		-	R2:3 minutes				
_				1-5/4 XZ	╨	_	TVZ.5 Hilliates				
85	85.0			_	╁┰	_					
-44.0						Limestone					
-			2	85.4, 85.6, 86.3, 86.6, 86.8, 87.0' -	₩	- 85.0-88.7' - moderate yellowish brown, (10YR 5/4), medium to	_				
-				Mechanical break (6), rough, undulating, associated with cavities, open 1/4"-2"	ш	coarse grained, moderate to strong	-				
-			3	associated with cavilles, open 174 -2	+	<ul> <li>HCl reaction, extremely weak to</li> </ul>	-				
_						weak (R0 to R2), voids (up to 1/8")	_				
	R3-NQ 5 ft	73	1		ш	cover 25% of surface, moderately fossiliferous (casts and molds up to					
	100%	13	' '		$\vdash$	3/16"-3/8"), 2"x1-3/8" cavities over					
1 -						10% of surface, percentage of voids	1				
-			0		╁	<ul> <li>coverage decreases with depth</li> </ul>	-				
1 -					厂	88.7-90.0' - moderate yellowish	R3:6 minutes				
-			1		╁┼	brown, (10YR 5/4), medium to coarse grained, strong HCl reaction,	13.0 minutes				
90	90.0		L l	89.8' - Fracture, 60 deg, smooth, undulating, —	二	weak to medium strong (R2 to R3),					
-49.0				tight	$\vdash$	up to 1/8" voids cover 15% of					
1 -			0		世	- surface, up to 3/8"x3/16" trace fossil	1				
1 -					╁	casts, trace organic matter 90.0-92.5' - Same as 88.7-90.0'	-				
1 -			1		世	<ul> <li>except trace cavities up to</li> </ul>	-				
1 -				91.65' - Bedding plane, horizontal, smooth,	ш	1-3/16"x2", fossiliferous material with	_				
1	R4-NQ	85	2	planar to stepped, tight 92.05' - Mechanical break, 10 deg, smooth,	$\bot$	casts up to 3/8"x3/4", up to 2"x2-3/4" trace infill					
1 -	5 ft 97%	00		undulating, tight		92.5-94.85' - grayish orange, (10YR	1				
1 -	1 0.73			92.8' - Fracture (2), 85 deg, smooth,	╨	7/4), fine to medium grained, strong	1				
-			1	undulating, intersecting, tight	仜	HCl reaction, weak to medium strong	-				
-				93.5' - Fracture or mechanical break, 10 deg, smooth, undulating, tight	+-	(R2 to R3), voids (up to 1/16") cover 5-15% of surface, trace dark	D4:44 minutes				
1 -			>3	94.2' - Fracture, 70 deg, smooth, undulating,	上	- (possible organic) material,	R4:11 minutes				
95	95.0			tight		carbonate material					
					1						
L					1						
					-		_				



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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722835.8 N, 458289.6 E (NAD83)

ELEVATION: 41.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

WATER	WATER LEVELS : 3.5 ft bgs on 05/17/2007 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested									
				DISCONTINUITIES	ŋ	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
-54.0 _			( <u>NR</u> ) 1	94.5-94.55' - Fracture zone 95.05' - Bedding plane or mechanical break, <10 deg, rough, undulating, tight	Ħ	No Recovery 94.85-95.0' - Limestone 95.0-99.1' - grayish orange, (10YR	-			
- - - -	R5-NQ 5 ft 82%	60	0	97.0' - Fracture, 80 deg, smooth, undulating, tight		7/4), fine to medium grained, mild to moderate HCl reaction, weak (R2), voids (up to 3/16") cover 5-25% of the surface, trace dark (possible  Driller's Rem				
			>3		Ħ		Driller's Remark: Very crumbly feeling between			
			4	97.2' - Bedding plane, horizontal, smooth, planar, tight 97.75-97.85' - Fracture zone, fragments to 2" -						
-			0 NR	98.0' - Fracture or mechanical break, 45 deg, rough, undulating, open to fracture zone 98.15' - Bedding plane, <10 deg, smooth,		No Recovery 99.1-100.0'	R5:7 minutes			
100 <u> </u>	R6-NQ 5 ft 98%	68	2	undulating, dark stain on one face, open 1/2" 98.45' - Bedding plane or mechanical break, <10 deg, smooth, undulating, tight		Limestone 100.0-104.9' - Same as 95.0-99.1' except no extremely weak (R0) zone				
- -			3	98.8' - Fracture, 50 deg, rough, undulating 100.85' - Fracture, 20 deg, smooth, undulating to planar, tight 100.95' - Fracture, 70 deg, smooth,						
-			2	undulating to planar, tight, intersects fracture at 108.5'	Ħ	- -	-			
-			3	101.8' - Fracture, 40 deg, smooth, undulating, tight 101.9' - Fracture, 70 deg, smooth, undulating, tight						
-			>2	102.0' - Fracture, 20 deg, smooth, undulating, tight	Ħ	- -	R6:8 minutes			
105 -64.0 -	105.0		NR / >10	102.35' - Bedding plane, horizontal, smooth, undulating, tight — 103.1' - Fracture, 65 deg, smooth, undulating, tight	ulating, tight  1' - Fracture, 65 deg, smooth, undulating, 15.0 - 108.75' - Same as 95.0-99.1 except moderate HCl reaction, extremely weak (R0) zone at	Limestone	Driller's Remark: Soft			
-	75%	26	>2	103.45' - Fracture, 10 deg, smooth, undulating, tight 103.7' - Fracture, 20 deg, smooth, undulating,		between 105.5-106.5' and 107.0-108.0'				
-			>3	tight  104.4-104.55' - Fracture zone, fragments to 1"x2"  104.55' - Fracture, 30 deg, smooth, undulating, tight, open to fracture zone 104.8' - Fracture, 80 deg, rough, undulating, tight 105.0-105.4' - Fracture zone, fragments to 1-1/2"		- No Recovery 108.75-110.0'	]			
-			3		H		]			
-			NR				R7:6 minutes End of day on 05/17/2007			
110_ -69.0 - - - - - -		60	2	105.4' - Bedding plane or mechanical break, — 20 deg, smooth, undulating, open to fracture zone		Limestone - 110.0-115.0' - Same as 95.0-99.1'	at 17:10 — Begin coring on 05/18/2007 at 08:28			
			2	105.8' - Fracture, 20 deg, smooth, undulating, tight 105.9' - Fracture, 30 deg, smooth, undulating, tight to open 1/2" 106.45' - Fracture, 20 deg, smooth, undulating, tight to open 106.55' - Fracture, 60 deg, rough, undulating, tight to open 106.85-107.35' - Fracture zone, fragments to			]			
			1				]			
			3				Driller's Remark: Soft			
- - 115	115 0		2	1/2" 107.75-107.95' - Fracture zone, fragments to 1"x2"			between 113.5-114.5' R8:7 minutes			
110	110.0			-						



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GSC-12 SHEET 7 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722835.8 N, 458289.6 E (NAD83)

ELEVATION: 41.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

WATER	LEVELS: 3.5	ft bgs	s on 0	5/17/2007 START : 5/16/2007 END : 5/	19/20	D7 LOGGER : C. Wallested	
≥∩≘	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-74.0			3	108.4' - Fracture, 20 deg, smooth, undulating, tight - 108.6' - Fracture, 80 deg, smooth, undulating,		Limestone  - 115.0-117.6' - moderate yellowish brown, (10YR 5/4), fine grained, mild	_
-	R9-NQ 5 ft 52% 120.0	10	>3	tight, intersects fracture at 108.4' 110.05' - Fracture, 80 deg, smooth, undulating, tight, continues same fracture at		to moderate HCl reaction, medium strong (R3) rock becoming weak (R2) rock below 117.0', voids (up to	- -
-			>10	108.6' 110.85' - Bedding plane, horizontal, smooth, - undulating, tight	H	1/16") cover 10% of the surface, trace cavities up to 1/4", similar to 95.0-99.1'	-
- - - 120			NR	111.15' - Mechanical break 111.2' - Fracture, 10 deg, smooth, undulating, tight 111.25' - Fracture, 50 deg, smooth, undulating, tight, intersects fracture at 111.2' - 112.4' - Fracture or mechanical break, 65		90.0-99.1 No Recovery 117.6-120.0' - -	R9:7 minutes
-79.0 -	- R10-NQ		3	deg, rough, undulating, tight 113.35' - Fracture, 30 deg, smooth, undulating, tight 113.4' - Fracture, 75 deg, smooth, undulating,		Limestone - 120.0-121.5' - Same as 115.0-117.6' except extremely weak (R0) zone at 120.4-120.55'	
-			>3	tight, intersects fracture at 113.35' 113.8' - Bedding plane or mechanical break, 10 deg, smooth, undulating, tight, top of		121.5-122.35' - moderate yellowish brown, (10YR 5/4), fine to medium	Driller's Remark: At 121.5', 100% loss of circulation
-	5 ft 68%	40	3	extremely weak (R0) zone 114.2' - Bedding plane or mechanical break, 10 deg, smooth, undulating, tight, middle of		grained, moderate HCl reaction, medium strong (R3), voids (up to 1/16") cover 5-20% of surface, moderately fossiliferous with up to	- -
- -			NR	extremely weak (R0) zone 114.7-114.8' - Fracture zone, extremely weak (R0) zone 115.55' - Fracture, 70 deg, smooth, undulating, tight		3/16"x3/8" echinoid casts, harder fine grained light colored infill, trace voids in 121.95-122.0' and 122.2-122.35' 122.35-123.4' - moderate yellowish	R10:9 minutes
125_ -84.0 -	125.0 R11-NQ 5 ft 46%	2 0	>10	115.6' - Fracture, 20 deg, smooth, undulating, — tight, intersects fracture at 115.55' 115.9' - Fracture, 15 deg, smooth, undulating, tight		brown, (10YR 5/4), medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (up to 3/16") cover 15% of surface, trace	-
- -			>10	116.2' - Fracture, 80 deg, smooth, undulating, tight 116.4-116.6' - Fracture zone, fragments to		cavities up to 3/8"x2", 3/8"x2" trace fossil casts No Recovery 123.4-125.0'	-
-				1"x1-1/2" 116.75' - Fracture, 20 deg, smooth, undulating, tight 117.05-117.6' - Fracture zone, fragments to		Limestone 125.0-125.6' - Same as 95.0-99.1' except mild HCl reaction, no extremely weak (R0) zone	-
- -			NR	1"x1-1/2" 120.4' - Bedding plane or mechanical break, 10 deg, rough, undulating, tight to open 1/4"		Table 125.6-126.4' - Same as 121.5-122.35 except interbedded with hard light colored fine grained rock 126.4-127.3' - Same as 122.35-123.4	R11:6 minutes
130_ -89.0	130.0		>10	120.55' - Fracture, 35 deg, smooth, undulating, tight 120.6' - Fracture, 10 deg, smooth, undulating,		except weak to medium strong (R2 to R3)	
-			-10	tight 121.2' - Bedding plane, horizontal, smooth, undulating, tight 121.2' - Bedding plane, horizontal, smooth, undulating, tight 121.2-121.5' - Fracture zone, fragments to		No Recovery 127.3-130.0' Limestone 130.0-130.5' - Same as 121.5-122.35 except interbedded	Drillar's Remark: Very soft
- - - -	R12-NC 5 ft 10%	0	NR	1"x2" 121.8-121.9' - Fracture zone, 1" fragments 122.35' - Bedding plane, horizontal, smooth, undulating, tight 123.05' - Fracture, 35 deg, smooth, undulating, tight to open 1/4" 123.15' - Fracture, 45 deg, smooth, planar,		No Recovery 130.5-135.0'	Driller's Remark: Very soft between 131.5-134.0'
135	135.0			tight			-

ORIENTATION : Vertical



PROJECT NUMBER:

33884.FL

BORING NUMBER:

GSC-12

SHEET 8 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722835.8 N, 458289.6 E (NAD83)

ELEVATION: 41.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

ORIENTATION: Vertical

WATER	LEVELS : 3.5			5/17/2007 START : 5/16/2007 END : 5/		D7 LOGGER : C. Wallested	
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	C LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H B ATIC	E RU STH, OVEF	(%) Q	TUF FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SURF	SORI	ROI	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-94.0	012			123.3' - Bedding plane, horizontal, smooth,		Limestone	
-			>10	undulating, tight, voids and cast parallel to break	╁	<ul> <li>135.0-137.8' - dark yellowish orange to moderate yellowish brown, (10YR)</li> </ul>	-
-				125.0-125.3, 125.6-125.7' - Fracture zone	F	6/6 to 10YR 5/4), medium grained,	1
-			>10	(2), fragments to 3/4"x1-1/2" - 126.1-126.4' - Fracture zone, fragments to	Ħ	<ul> <li>weak to medium strong (R2 to R3), voids (up to 3/16") over 5-15% of</li> </ul>	1
-	R13-NG		2	1"x2", many parallel horizontal bedding plane	L	surface, casts (up to 3/16"x3/8")	1
-	5 ft 56%	8		breaks 126.65' - Bedding plane, horizontal, smooth,	Ľ	<ul> <li>cover 5% of surface, 1" thick trace light gray fine grained infill at the end</li> </ul>	1
_				undulating, tight	H	of run, no voids visible at - 136.85-136.95'	1
_			NR	126.75' - Fracture, 70 deg, smooth, undulating, tight	$\vdash$	No Recovery 137.8-140.0'	1
				127.0, 127.15' - Fracture (2), 10 deg, smooth, undulating, tight	Ш		R13:6 minutes
140_	140.0			130130.5' - Fracture zone, fragments to	ш		
-99.0			>10	1"x2" parallel to horizontal bedding planes in many places	ш	Limestone - 140.0-143.3' - pale yellowish brown	
_				135.0-137.0' - Fracture zone, fragments to 2"x3"	上	with grayish orange mottling, (10YR	
-			2	137.4' - Fracture, 20 deg, smooth, undulating .		6/2 with 10YR 7/4), fine to medium grained, moderate HCl reaction,	_
_	DAANO	[		137.65' - Bedding plane, horizontal, smooth, undulating, open 1/4"	H	medium strong (R3), voids (up to 1/8") cover 5-15% of surface, cavities	_
-	R14-NQ 5 ft	{   27	>10	140.0-140.75' - Fracture zone, fragments to	H	<ul><li>(up to 3/4"x9/16") over 5% of</li></ul>	_
_	66%		>1	2"x2" 141.85' - Fracture, 80 deg, smooth,	H	surface, casts (up to 1-3/16" size) cover 5-10% of surface, cavities filled	-
-			-	undulating, tight 142.0' - Fracture, 10 deg, smooth, undulating,	L	<ul> <li>with pale yellowish brown infill with</li> </ul>	-
-			NR	dark stain, tight	世	voids over 30% of the infill; at 140.0-140.3' darker coarse grained	R14:17 minutes
				142.05-142.5' - Fracture zone, fragments to 1"x2"	Н	<ul> <li>and high percentage of void coverage</li> </ul>	-
145 <u></u> -104.0	145.0			142.85-142.95' - Fracture zone, 1" fragments —	₩	No Recovery 143.3-145.0'	
-			>10	143.1-143.3' - Fracture zone, fragments to 1"x2"	F	Limestone 145.0-147.6' - grayish orange, (10YR	-
-				145.0-145.25' - Fracture zone, fragments to 1-1/2"x2"	忹	7/4), fine grained, strong HCl	1
-			8	145.35, 145.6, 146.15, 146.2, 146.3, 146.5,	Þ	<ul> <li>reaction, medium strong (R3), trace voids (up to 1/16"), trace fossil casts</li> </ul>	1
_	R15-NG		>2	146.7, 147.1, 147.35, 147.5, 147.5' - Bedding plane (10), horizontal, smooth, planar, tight	┢	(up to 1/8"x3/16"), trace dark laminations	1
_	5 ft 52%	0		145.4' - Fracture, 45 deg, smooth, planar,		No Recovery 147.6-150.0'	1
-				tight - 145.85-146.2' - Fracture zone, fragments to	╁		1
			NR	2"x2-1/2", multiple high angle fractures and bedding planes	F		Driller's Remark: Regained -
l _				146.7' - Fracture, 65 deg, smooth, undulating,	F	_	circulation at 149.0'
	150.0			tight 147.35-147.6' - Fracture zone, fragments to    —	片	L.,	R15:12 minutes
-109.0 -			>4	2"x2-1/2" 150.1, 150.45, 150.65, 151.3, 151.7, 152.5,	H	Limestone - 150.0-151.3' - moderate yellowish	Driller's Remark: Regained 100% circulation at 150.0';
-				152.6, 153.4, 153.55, 153.7, 153.8' - Bedding	片	brown, (10YR 5/4), coarse grained,	water level 4.0' below
1 -			>2	plane (11), horizontal, smooth, planar to undulating, tight to open 1/4"	世	mild HCl reaction, weak (R2), voids  – (up to 1/8") cover 30-35% of surface,	ground surface at 13:30 Driller's Remark: At 151.0', -
-	R16-NG			150.8-151.3' - Fracture zone, fragments to	F	no visible fossil or cavities 151.3-153.9' - Same as 145.0-147.6'	circulation drops to 25%
-	5 ft	48	2	1"x2"	F	<ul> <li>except mild HCl reaction, voids cover</li> </ul>	-
-	78%			-	匚	5-10% of surface and increase abruptly to 15-30% at 153.4', trace	-
1 -			>4	-	口	<ul> <li>fossil casts (up to 3/16"x3/8"), rock strength decreases to weak rock</li> </ul>	-
-				-	口	(R2) at 153.4' and coverage by dark	R16:10 minutes
155	155.0		NR	-	╁	<ul> <li>wavy laminations increases to 10% after 153.4'</li> </ul>	
133	100.0						



PROJECT NUMBER:

338884.FL

BORING NUMBER:

GSC-12

SHEET 9 OF 10

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722835.8 N, 458289.6 E (NAD83)

ELEVATION: 41.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing

WATER	LEVELS : 3.5	ft bg	s on 0	5/17/2007 START : 5/16/2007 END : 5/	19/200	D7 LOGGER : C. Wallested	
≥0 <i>≎</i>	(%			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-114.0 	R17-NG 5 ft 95% 160.0 R18-NG 5 ft 74%	34	3 6 >7 2 3 NR >2 >4 2 1	155.15, 155.4, 155.8, 156.0, 156.4, 157.2, 157.25, 157.45, 157.6, 157.9, 158.1, 158.6, 158.7' - Bedding plane, horizontal, smooth, planar to undulating, tight to open 1/4" 156.1' - Fracture, 45 deg, rough, undulating, tight 156.2' - Fracture, 45 deg, rough, undulating, open 156.8' - Mechanical break or bedding plane, horizontal, rough, undulating, tight 156.9, 156.95' - Fracture (2), 75 deg, rough, undulating, tight 157.6-157.8' - Fracture zone, fragments to 2" 158.85' - Fracture, 30 deg, smooth, undulating, tight 159.0-159.2' - Fracture zone, fragments to 3/4"x2" 160.0-160.4' - Fracture zone, fragments to 2"x1" 160.8, 161.3, 161.35, 161.55, 161.6, 161.7, 162.05, 162.95, 163.3' - Bedding plane, horizontal, smooth, planar, tight to open 1/4" 160.9' - Fracture, 70 deg, smooth, undulating, tight 161.3-161.35' - Fracture zone, fragments to 14"x2" moethy planar, bedding plane		No Recovery 153.9-155.0' Limestone  155.0-157.9' - grayish orange to moderate yellowish brown, (10YR 7/4 to 10YR 5/4), fine grained, moderate HCI reaction, weak to medium strong (R2 to R3), voids (up to 1/16") cover 5-15% of surface, trace cavities (up to 3/8")  157.9-158.5' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), very fine grained, strong HCI reaction, strong to very strong (R4 to R5), no voids or cavities  158.5-158.7' - Same as 155.0-157.9'  158.7-159.4' - Same as 157.9-158.5'  159.4-159.75' - Same as  155.0-157.9' except voids (up to 1/16") coverage increasing to 25%  No Recovery 159.75-160.0' Limestone  160.0-161.4' - Same as 157.9-158.5' except fossil casts to 3/8"x3/4" and voids cover 5-30% of surface  161.4-161.6' - Same as 157.9-158.5' 161.6-162.5' - Same as 160.0-161.4	Driller's Remark: Soft drilling at 158.5-159.0' - R17:6 minutes - Driller's Remark: Very soft at 161.0-162.0' -
- 165_ -124.0	165.0		NR	1/4"x2", mostly planar bedding plane - - -		162.5-163.7' - Same as 157.9-158.5'  No Recovery 163.7-165.0'	R18:5 minutes
- - - - - -	R19-NC 5 ft 96%	28	>6 >4 5 2 4	165.3' - Fracture, 80 deg, smooth, planar, open, fragments 165.35, 165.4, 165.55, 165.7, 165.85, 166.45, 166.55, 166.65, 166.95, 167.1, 167.4, 167.6, 167.75' - Bedding plane (13), horizontal, smooth, planar, tight 166.55-166.65' - Fracture zone, fragments to 1/4"x1", mostly planar, horizontal bedding plane 168.0, 168.1' - Fracture (2), 10 deg, smooth, planar, tight 168.35' - Fracture, 45 deg, smooth, undulating, tight 169.1' - Fracture, 35 deg, smooth, undulating,		Limestone  165.0-167.8' - repeated alternating transitions between moderate yellowish brown and pale yellowish brown, (10YR 5/4 and 10YR 6/2), moderate HCI reaction, medium strong to strong (R3 to R4), pale yellowish brown material is very fine grained and stronger, with no voids, moderate yellowish brown material is fine grained with 20-30% voids, 5% medium grained gray limestone imbedded in the matrix of the moderate yellowish brown material (possible infill), gradual transition to	Begin coring on 5/19/07 at 08:05
170 17 -129.0	R20-NC 5 ft 100%	69	NR 5 >3 2 1 4	tight 169.1 - Fracture, 60 deg, smooth, undulating, tight 169.5' - Fracture, 60 deg, smooth, undulating, tight 169.5' - Fracture, 60 deg, smooth, undulating, tight 169.6' - Fracture, 10 deg, smooth, undulating, tight 170.35, 170.75, 170.85, 170.9, 171.1, 171.55, 174.05' - Bedding plane (7), horizontal, smooth, planar, tight except by fracture zone 170.7' - Fracture, 80 deg, smooth, undulating, tight 171.55-171.9' - Fracture zone, fragments to 1"x2-1/2"		(possible infill), gradual transition to limestone at 167.8-169.8'  167.8-169.8' - yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), fine to medium grained, moderate HCI reaction, medium strong (R3), voids (up to 1/8") over 5-25% of surface, fossil casts (up to 3/16"x3/8") over 10% of surface, trace dark grey infill (to 1/8"x1"), delayed HCI reaction  No Recovery 169.8-170.0'	R20:7 minutes
175	175.0		•				

ORIENTATION : Vertical



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	GSC-12	SHEET	10	OF	10	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722835.8 N, 458289.6 E (NAD83)

ELEVATION: 41.0 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Gainesville, FL; Driller: M. Boatright; Cathead Operator: G. Davis

CORING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, FLUID LOSS, CORING F SIZE AND DEPTH OF G MINERALOGY, TEXTURE, FLUID LOSS, CORING F SMOOTHNESS, CAVII  AND POOR MASS SMOOTHNESS, CAVII	00111110	WE IT IOD / II	ND LC	ZOII IV	IENT: CME 550 S/N 186073, mud rotary, NQ tools, HW	Casiii	1	ORIENTATION : Vertical
DESCRIPTION   ROCK TYPE, COLOR, MINERALORY, TEXTURE, WEATHERING, HARDNESS, PLANARITY, INFILLING MATERIAL AND OF Facture 20 deg, smooth, undulating, tight   171.9' - Fracture, 30 deg, smooth, undulating, tight   173.7' - Fracture, 20 deg, smooth, undulating, tight   173.8' - Fracture, 20 deg, smooth, undulating, tight   173.8' - Fracture, 20 deg, smooth, undulating, tight   173.9' - Fracture, 20 deg, smooth, undulating, tight   174.6' - Fracture, 20 deg, smooth, undulating, tight   175.5' - Fracture, 20 deg, smooth, undulating, tight   175.5' - Fracture, 20 deg, smooth, undulating, tight   175.5' - Fracture, 20 deg, smooth, undulating, tight   175.5' - Fracture, 20 deg, smooth, undulating, tight   175.5' - Fracture, 20 deg, smooth, undulating, tight   176.4' - Same as 167.8-169.8' except trace cavities up to 1-9/16' with grayish orange very weak rock (R1) at 170.9-171.15' and 173.95-174.1'   175.0' - Same as 167.8-169.8' except trace cavities up to 1-9/16' with grayish orange very weak rock (R1) at 170.9-171.15' and 173.95-174.1'   175.0' - Same as 167.8-169.8' except trace cavities up to 1-9/16' with grayish orange very weak rock (R1) at 170.9-171.15' and 173.95-174.1'   175.0' - Same as 167.8-169.8' except trace cavities up to 1-9/16' with grayish orange very weak rock (R1) at 170.9-171.15' and 173.95-174.1'   175.0' - Same as 167.8-169.8' except trace cavities up to 1-9/16' with grayish orange very weak rock (R1) at 170.9-171.15' and 173.95-174.1'   175.0' - Same as 167.8-169.8' except trace cavities up to 1-9/16' with grayish orange very weak rock (R1) at 170.9-171.15' and 173.95-174.1'   175.0' - Same as 167.8-169.8' except trace cavities up to 1-9/16' with grayish orange very weak rock (R1) at 170.9-171.15' and 173.95-174.1'   175.0' - Same as 167.8-169.8' except trace cavities up to 1-9/16' with grayish orange very weak rock (R1) at 170.9-171.15' and 173.95-174.1'   175.0' - Same as 167.8-169.8' except trace cavities up to 1-9/16' with grayish orange very weak rock (R1) at 173.95-174.1'   175.0' - Total	WATER L	EVELS: 3.5	ft bgs	s on 0	5/17/2007 START : 5/16/2007 END : 5/	19/20	D7 LOGGER : C. Wallested	
DESCRIPTION   Size AND DEPTH OF SUMPLY Size AND DEPTH OF SUMPLY Size AND DEPTH OF SUMPLY Size AND DEPTH OF SUMPLY Size AND DEPTH OF SUMPLY Size AND DEPTH OF SUMPLY Size AND DEPTH OF SUMPLY Size AND DEPTH OF SUMPLY Size AND ROCK MASS (AND ROCK MASS SUMPLY Size AND ROCK MASS SU								COMMENTS
1	DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Ø	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
185 185.0	-134.0 - - - - - - - - - - - - - - - - - - -	R21-NQ 5 ft 80% 180.0 R22-NQ 5 ft	55	1 3 >7 10 NR 3 1 2 0	fracture zone 172.25' - Fracture, 30 deg, smooth, undulating, tight 172.7' - Fracture, 20 deg, smooth, undulating, tight 173.7' - Bedding plane, <5 deg, smooth, undulating, dark stain, tight 174.6, 174.65' - Fracture (2), 50 deg, smooth, undulating, tight 175.4, 176.35, 176.38, 176.4, 177.05, 177.15, 177.25, 177.55, 177.6, 177.85, 178.3, 178.32, 170.4, 178.45, 178.49, 178.5, 178.51, 178.53' - Bedding plane (18), horizontal, smooth, planar, tight 177.2' - Fracture, vertical, smooth, undulating, missing opposite faces 177.55-177.6' - Fracture zone, fragments to 1/4"x1/2" 178.9, 178.95' - Fracture (2), 75 deg, smooth, undulating, tight 180.05, 181.7, 182.55, 182.75' - Bedding plane, horizontal, smooth, planar to undulating, tight to open 1/4" 180.4' - Fracture, 70 deg, smooth, undulating, missing face 180.75' - Fracture, 60 deg, smooth,		- 170.0-175.0' - Same as 167.8-169.8' except trace cavities up to 1-9/16" with grayish orange very weak (R1) infill, voids (up to 1/16") cover 20% of infill, laminated layers of very weak rock (R1) at 170.9-171.15' and 173.95-174.1' 175.0-176.4' - Same as 167.8-169.8' except trace cavities up to 3/16"x1-9/16" lying parallel to bedding 176.4-179.0' - sequences of interbedded limestone that begins as similar to 145.0-147.6' then grades into material similar to 167.8-169.8', except trace cavities to 3/16"x1-9/16", cavities are mostly parallel to bedding, sequences run 176.4-177.25', 177.25-177.7', 177.7-178.55', and 178.55-179.0' No Recovery 179.0-180.0' Limestone 180.0-182.2' - Same as 167.8-169.8' except trace fossil casts and trace dark laminations 182.2-184.6' - Same as 165.0-167.8' except poorly competent, extremely	- - - - - - -
		185.0		1			184.6-185.0' - Same as 165.0-167.8' Bottom of Boring at 185.0 ft bgs on	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-01	SHEET	1	OF	15	

# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLIN	<u>G METH</u>	OD AND	<u>EQUIPM</u>	ENT : Rotosonic	S/N SR-116, sonic, 8" s	surface casing, 6" outer cas	sing and 4" core I	oarrel	ORIENTATION : Vertical
WATER	LEVELS	: 3.65 bg	s on 3/6/0	)7	START : 2/20/2007	END: 2/22/2007	LOGGER	R : R.	Gomez
				STANDARD		SOIL DESCRIPTION		<sub>0</sub>	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				SYMBOLIC LOG	
BH		RECOVE	RY (ft)			USCS GROUP SYMBOL, ONTENT, RELATIVE DEN		Ę	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH EVA			#TYPE	6"-6"-6"		, SOIL STRUCTURE, MIN		MB	INSTRUMENTATION
SU				(N)				ς	
42.5	0.0				sand, trace nonp	<li>I3), moist to wet, fine gra</li>	iined, silica		"Water level is based on Ground Water Monitoring at LNP site (FSAR Table - 2.4.12.08)"
-					yellowish orange,	te yellowish brown gradi (10YR 5/4 to 10YR 6/6) poorly graded, with non	, moist to		-
-		6.0	R1-SN		grained, silica sai	llowish orange, (10YR 6/ nd, with nonplastic to low			Water levels were not recorded for I-01
5 37.5					_\ 4.0-4.5' - yellowis	<pre>/ Lean Clay (CL-ML) h gray, (5Y 7/2), moist, lead, blocky, with fine graine nd (CH)</pre>	ow to d silica sand		
-	6.0				\4.5-5.0' - medium	light gray, (N6), moist to lasticity, with fine graine		$\  \ $	-
-					Silt (ML)	,		$\  \ $	-
-						ale orange, (10YR 8/2), replasticity, carbonate materials		$\  \ $	-
-					nonplastic to low	plasticity, carbonate mai	leriais	$\  \ $	-
-							-	$\  \ $	-
-							-	┨║	-
-							-	$\  \ $	-
l	-						-	$\  \ $	-
10 32.5							_	$\  \ $	_
-							-	$\  \ $	-
-		10.0	R2-SN				-	$\  \ $	-
-							-	$\  \ $	-
-							-	$\  \ $	-
-							-	$\  \ $	-
-	-				Silt With Limesto	one Fragments (ML)	-	┨║	-
-					13.0-16.0' - verv	pale orange. (10YR 8/2).	moist,	$\  \ $	-
-					limestone fragme	plasticity, with sand to gi ents, sample is about 50%	ravei-sized % silt and	$\  \ $	-
- 45					50% limestone fra	agments, all carbonate n	naterials -	$\  \ $	-
15 <u> </u>							_	1	-
-	400						-	1	-
-	16.0				16.0-19.0' - Same	e as 13.0-16.0' except gr	eater	$\  \ $	-
-					percentage of silt			<b>1</b>	-
-							-	<b>1</b>	-
-							-	1	-
-								$\  \ $	-
-							-	$\  \ $	-
-					Limestone			₩	-
-					¬ 19.0-19.5' - very	pale orange, (10YR 8/2),	full	m	-
20					\core-uiameter (4	) fragments 1" thick		╂╨	
1									



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# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache ELEVATION: 42.5 ft (NAVD88)

DRILLIN	G METH	OD AND	EQUIPM	ENT : Rotosonic S	S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core b	oarre	ORIENTATION : Vertical
WATER	LEVELS	: 3.65 bg	s on 3/6/0	)7 S	TART : 2/20/2007 END : 2/22/2007 LOGGER	R : R.	
2001				STANDARD	SOIL DESCRIPTION	ő	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COIL NAME LISCS CROUD SYMBOL COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
A BE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	Ĭ S O L	DRILLING FLUID LOSS, TESTS, AND
EV.			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	ΥME	INSTRUMENTATION
<u> </u>				(N)	Sandy Silt (ML)	S	
-		10.0	R3-SN		19.5-24.5' - pale yellowish brown, (10YR 6/2), moist to wet, nonplastic to low plasticity, blocky, all carbonate materials	- - -	- - -
- - -					- - -	- - -	- - - -
					Limestone Fragments	ш	-
25 17.5					24.5-26.0' - very pale orange, (10YR 8/2), — fossiliferous, fragments up to 3"-4"	Ħ	Top of rock estimated to be approximately 26.0' below ground surface -
						Ш	20.0 below ground surface
-					Begin Rock Coring at 26.0 ft bgs See the next sheet for the rock core log	1	_
_							_
					<u>-</u>		_
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12.5							
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-					-		1
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-					<del>-</del>	1	1
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35					<del>-</del>	1	-
35 7.5					<del>-</del>	1	-
-					<del>-</del>	1	-
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40						$\vdash$	-



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.6	5 bgs	on 3/6	5/07 START : 2/20/2007 END : 2/2	22/200	D7 LOGGER : R. Gomez	
≥∩≘	_ (%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 30_ 12.5 - -	26.0 R4-SN 10 ft 70%	NA	NA	26.0-36.0' - NA		Limestone  26.0-29.7' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), mild HCI reaction, fossiliferous, fine to coarse sand and fine to coarse gravel-size limestone fragments, all carbonate materials  Limestone Fragments  29.7-33.0' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), mild to strong HCI reaction, non fossiliferous, full core-diameter fragments up to 2" thick	Set 8" casing to 28" with bentonite around between 8" to 6" casing
357.5	36.0		NR	- - - -		No Recovery 33.0-36.0'	- - - - - -
- - - - - 40 2.5	R5-SN 10 ft 75%	NA	NA	36.0-46.0' - NA		Limestone  36.0-38.0' - dark yellowish brown, (10YR 4/2), dry, moderate HCI reaction, very weak to weak (R1 to R2), voids (<1/16") over 50-70% of surface, cavities up to 3/8" over 10-15% of surface, fossiliferous  Silt With Limestone Fragments 38.0-41.0' - dark yellowish brown, (10YR 4/2), wet, sand to gravel-sized limestone fragments, fossiliferous  Limestone Fragments 41.0-42.0' - limestone fragments from sand to fine gravel-sized,	SC-1 collected at 36.0- 37.3' -
   45 -2.5	46.0		NR	- - -		fossiliferous  42.0-43.5' - dark yellowish brown, moderate HCl reaction, silt to fine gravel-sized limestone fragments  No Recovery 43.5-46.0'	- - - - - -



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	I <u>-</u> 01	SHEET	4 OF 15

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 3.6	5 bgs	on 3/6	5/07 START : 2/20/2007 END : 2/2	22/20	007 LOGGER : R. Gomez	
<b>₹</b> ₽₽	(%)			DISCONTINUITIES	ő	LITHOLOGY	COMMENTS
ELO N (#	AND 3₹ (%	_	ZES T	DESCRIPTION	S C	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R6-SN 10 ft 100%	NA	NA	46.0-56.0' - NA		Limestone  46.0-47.0' - Same as 36.0-38.0' except medium to coarse grained, voids (<1/16") over <40% of surface at 46.0-46.7', fossiliferous Limestone Fragments 47.0-51.0' - mild to moderate HCI reaction, fossiliferous, limestone fragments sand to gravel-sized and up to 2-1/2"  51.0-53.0' - fine grained, medium strong to strong (R3 to R4), 10-20% fossils (casts/molds), sand to gravel-sized fragments up to 2-1/2"  Silt (ML) 53.0-56.0' - moderate yellowish brown, (10YR 5/4), nonplastic, mild to moderate HCI reaction	SC-2 collected at 46.0-46.7' -
	R7-SN 10 ft 93%	NA	NA	56.0-66.0' - NA		Limestone Fragments  - 56.0-57.0' - limestone fragments <3-1/2" in size, fossiliferous  Clay (CL)  - 57.0-58.8' - dark yellowish orange, (10YR 6/6), low to medium plasticity, moderate HCl reaction, unconsolidated material, <20% silt at - 58.8'  Limestone Fragments - 58.8-61.0' - Same as 56.0-57.0'  Clayey Silt (CL-ML) - 61.0-61.7' - light brown to moderate yellowish brown, (5YR 5/6 to 10YR - 5/4)  Limestone Fragments - 61.7-65.3' - dark yellowish brown, (10YR 4/2), moderate HCl reaction, very weak to weak (R1 to R2), 50-70% voids <1/16", cavities to 3/8" over 10-15% of surface, fossiliferous	SC-3 collected at 63.0-63.9'  End drilling for the day; R8 is down-hole, will retrieve in morning
-	66.0		NR	-	Ħ	- No Recovery 65.3-66.0'	in moning



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.6	5 bgs	on 3/6	6/07 START : 2/20/2007 END : 2/	22/20	07 LOGGER : R. Gomez	
>00	(9			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R8-SN 10 ft 100%	NA	NA	66.0-76.0' - NA		Limestone  66.0-71.5' - moderate yellowish brown, (10YR 5/4), weak to medium strong (R2 to R3), <10% cavities across surface, fossiliferous  Clay (CH)  71.5-72.3' - dark yellowish orange, (10YR 6/6), moist, mild HCl reaction, carbonate material  Limestone Fragments 72.3-73.6' - very fine grained, strong HCl reaction, extremely weak (R0), limestone fragments to 2", silty matrix  Silt (ML)  73.6-75.5' - dry, very stiff, nonplastic, strong HCl reaction, blocky, carbonate material	Resume drilling 2/21/07
80 -37.5 - - - - - - - - - - - - -	R9-SN 10 ft 75%	NA	NA NR	76.0-86.0' - NA		Silty Clay (CL) 75.5-76.0' - light brown, (5YR 5/6), moist, low to medium plasticity Limestone Fragments 76.0-79.0' - fragments up to 2-3/8", 15-30% fragments to 1-3/8", silty/clay (fines) matrix in limestone, fossiliferous (molds/casts/shell fragments) Silty Clay (CL) 79.0-79.3' - moderate yellowish brown, (10YR 5/4), moist to wet, soft, black organic partings in matrix Limestone Fragments 79.3-81.0' - Same as 76.0-79.0' Limestone 81.0-82.5' - fossiliferous  Limestone Fragments 82.5-83.5' - fragments up to 2-1/2", breaks between fragments mostly caused by fractures within rocks and mechanical breaks from drilling No Recovery 83.5-86.0'	SC-5 collected at 81.0-82.5'



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.6	5 bgs	on 3/6	S/07 START : 2/20/2007 END : 2/	22/200	7 LOGGER : R. Gomez				
<b>₹</b> □₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
- - -				86.0-96.0' - NA		Silty Clay (CL)  86.0-89.1' - grayish orange pink, (5YR 7/2), strong HCl reaction, unconsolidated, carbonate matrix, <5% sand, 10-15% coarse gravel-size limestone fragments (<3/4")	- - - -			
90 -47.5 - - -	R10-SN 10 ft i 100%		A NA	NA NA	A NA			Limestone 89.1-89.7' - very pale orange, (10YR 8/2), very fine grained, strong HCl reaction  Clay (CH) 89.7-90.7' - moderate yellowish brown, (10YR 4/2), dry to moist, very stiff, with silt (ML), blocky partings  Limestone Fragments 90.7-93.0' - very pale orange, (10YR 8/2), fine grained, strong HCl	- - - - - - -	
- 95_ -52.5 -	96.0					reaction, fragments up to 3/4"  Clayey Silt (ML) 93.0-94.0' - light brown, (5YR 5/6), dry to moist, strong HCl reaction, carbonate matrix  Limestone Fragments 94.0-96.0' - sand to gravel-sized fragments, weak (R0), fossiliferous (molds/casts/shell fragments) 96.0-99.0' - very pale orange, (10YR	- - - - -			
- - - - -				96.0-106.0' - NA		- 8/2), strong HCl reaction, 50% silty matrix, sand to gravel-sized fragments, poorly to moderately fossiliferous (10-20%)	- - - - -			
100 -57.5 - - -	R11-SN 10 ft 100%	: NA	NA	NA	NA NA	NA			99.0-99.2' - extremely weak (R0),   black organic partings   Limestone   99.2-101.0' - Same as 96.0-99.0'   Clayey Silt (ML)   101.0-103.0' - dry, very stiff, low to medium plasticity, strong HCl reaction, blocky partings	- - - - - -
- - 105 -62.5	106.0			- - -		Limestone - 103.0-105.0' - Same as 96.0-99.0' - 105.0-105.1' - very pale orange, - (10YR 8/2), very fine grained, poorly fossiliferous (<10% coverage)	- - - -			



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER L	EVELS: 3.6	5 bgs	on 3/6	6/07 START : 2/20/2007 END : 2/3	22/200	D7 LOGGER : R. Gomez	
≥0 00	<u></u>			DISCONTINUITIES	ڻ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
110 -67.5 - - - - - - - - - - - - - - - - - - -	R12-SN 10 ft 100%		NA	106.0-116.0' - NA		Limestone  105.1-105.8' - fragments 105.8-106.0' - Same as 105.0-105.1' 106.0-109.5' - grayish orange, (10YR 7/4), very fine to fine grained, strong HCl reaction, laminar bedding, where the pieces are broken down the material is silt-sized, fragments to 3/8" in size  109.5-114.0' - very fine to fine grained, sand to gravel-sized fragments, non fossiliferous  114.0-114.2' - dark yellowish brown, (10YR 4/2), strong HCl reaction, laminated bedding 114.2-121.0' - very pale orange, (10YR 8/2), very fine to fine grained,	-
120 -77.5 - - - - - - - - - - - - - - - - - - -	R13-SN 10 ft 100%		NA	116.0-126.0' - NA		strong HCl reaction, 20-30% gravel-sized and 70-80% fines, fragments up to 2"  Disaggregated Limestone 121.0-126.0' - pale yellowish brown, (10YR 6/2), strong HCl reaction, with sand-sized to fine gravel-sized limestone fragments	Rock disaggregated due to sonic drilling method



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

				ILIVI : Notosonic 5/N 5/N-110, sonic, 6 Sunace casing, 6			ORIENTATION: Vertical
WATER	LEVELS : 3.6	55 bgs	on 3/		22/200		00141451470
ĕQ£	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	N, ANE	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A A CE	: RU TH,	(%) O	TUF:	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	<u>ا</u>	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FR	ORE ING	αD	RAC ER F	PLANARITY, INFILLING MATERIAL AND	/MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	225	ď	H H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	1 1, 1 11 1,
					Ш	Limestone - 126.0-136.0' - grayish orange to pale	
						yellowish brown, (10YR 7/4 to 10YR	1
-				126.0-136.0' - NA	Н	6/4), very fine to fine grained, strong	1
_				-		<ul> <li>HCl reaction, sand to gravel-sized weak (R2) limestone fragments,</li> </ul>	1 1
_				-		grains and gravel reduce to silt-sized	1
-				-	ш	<ul> <li>material (rock flour), few fine grained weak to medium strong (R2 to R3)</li> </ul>	1
-				-		fragments from 132.0-133.5'	1
_				-	Н	-	1 -
130 <u> </u>				_			-
-67.5				_	Ш	_	1
_	R14-SN 10 ft		NA	_	ш	_	1
	100%			_		_	_
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135 <u> </u>							
- 02.0				-		-	1
_	136.0			-	ш	- 400 0 400 01 0 400 0 400 01	1
_				_	Н	136.0-136.9' - Same as 126.0-136.0' - 136.9-142.5' - very pale yellowish	1
_				_		brown, (10YR 6/2), medium strong to	_
				136.0-146.0' - NA		strong (R3 to R4), very fossiliferous, up to 70% covered in fossil	
					Ш	shells/casts/molds, 10-20% covered	
				_		in voids (<1/16" up to 3/8"), cavities	1
_				-	Н	<ul> <li>up to 4-3/4", broken sand to gravel-sized pieces at 139.0-139.5'</li> </ul>	1 1
-				-		_ g.uve. eeu p.eeee ut 100.0 100.0	1
140				-		-	1
140 -97.5				<del>-</del>	Ш	<del></del>	I ⊣
-	R15-SN			-		-	1 -
_	10 ft		NA	-	Н	-	
_	100%			-		_	1 -
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_				_			
_				_		Silty Clay (CL)	]
						4/4), dry, low plasticity, blocky	
]					Ш	partings	1
]					$\Box$	Limestone 143.0-146.0' - Same as 126.0-136.0'	1
145				-	口	_ 1.0.0 170.0 Came as 120.0-100.0	1
-102.5					Ш	<del></del>	
-	440.0			-	Ш	-	1
	146.0				П		
							-



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 3.6	35 bgs	on 3/6	6/07 START : 2/20/2007 END : 2/2	22/20	07 LOGGER : R. Gomez		
\$ ∩ £	(%)			DISCONTINUITIES	စ္က	LITHOLOGY	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.	
-	032			146.0-156.0' - NA		Limestone  - 146.0-148.7' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, strong to very - strong (R4 to R5), <1/16" voids over <10% of surface, trace fossils	SC-6 collected at 146.3- 147.2' -	
- 150 -107.5			NA NA	NA	- - -		148.7-151.0' - strong HCl reaction,     silt to fine gravel-sized limestone     fragments	- - -
-	R16-SN 10 ft 88%	i		- - - -		151.0-151.9' - strong HCl reaction, - very weak to weak (R1 to R2), very fossiliferous 151.9-154.0' - Same as 148.7-151.0'	- - - -	
- 155 -112.5	450.0		NR	- - - -		Limestone Fragments 154.0-154.8' - strong HCl reaction No Recovery 154.8-156.0'	- - - -	
- - - -	156.0			156.0-166.0' - NA		Disaggregated Limestone  156.0-161.6' - pale yellowish brown, (10YR 6/2), strong HCl reaction, silt to coarse gravel-sized limestone fragments	- - - -	
- 160 -117.5 -	R17-SN 10 ft 100%	NA	NA	- - - -		- - - -	- - - - -	
- - - -				- - - -		Limestone  161.6-161.8' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, medium strong to strong (R3 to R4), non fossiliferous Disaggregated Limestone 161.8-163.0' - strong HCl reaction, carbonate materials	- - - -	
165_ -122.5 -	166.0					Limestone Fragments  163.0-165.7' - moderate brown, (5YR 4/4), fine grained with silt, silt to 1" size limestone fragments	-	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-01	SHEET	10	OF	15	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATERLE	VELS: 3.6	5 bgs	on 3/6	5/07 START : 2/20/2007 END : 2/2	22/20	D7 LOGGER : R. Gomez	
≥0.00	<u></u>			DISCONTINUITIES	ڻ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R18-SN 10 ft 100%	NA	NA			Limestone  165.7-166.0' - moderate brown, (5YR 4/4), fine grained, weak to medium strong (R2 to R3), fossiliferous  166.0-170.0' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCI reaction, sand to gravel-sized fragments, trace laminated bedding with mild HCI reaction  170.0-172.0' - moderate yellowish brown, (10YR 5/4), fine grained, medium strong to strong (R3 to R4), 10-20% covered in cavities (up to 3/8" in size)  172.0-173.7' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCI reaction, rock-floor, silty matrix, sand to coarse gravel-sized fragments  173.7-174.2' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCI reaction, medium strong to strong (R3 to R4), laminated Disaggregated Limestone  174.2-176.0' - mild HCI reaction, up	- - - - - - - - - - - - - - - - - - -
180 -137.5 - - - - - - - - - - - - - - - - - - -	R19-SN 10 ft 100%	NA	NA	176.0-186.0' - NA		to 3/4" gravel-sized pieces of compacted silt and limestone Limestone 176.0-179.5' - Same as 126.0-136.0' except core fragments up to 2-1/2"  179.5-180.6' - moderate yellowish brown, (10YR 5/4), moderate HCI reaction, silt to fragments, soil like properties 180.6-183.0' - grayish orange, (10YR 7/4), medium to coarse grained, strong HCI reaction, shell fragments, molds, casts, 30-40% cavities to 3/8" in size  183.0-184.5' - Same as 179.5-180.6'  184.5-185.2' - Same as 176.0-179.5' 185.2-185.5' - Same as 180.6-183.0' 185.5-185.7' - Same as 183.0-184.5'	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-01	SHEET	11	OF	15	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel

ORIENTATION : Vertical

VVAILIVI	LEVELS: 3.6	35 bgs	on 3/6		22/200	D7 LOGGER : R. Gomez	
≩O⊋	(%			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE ANI SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
190 -147.5 - - - - - - 195 -152.5	R20-SN 10 ft 100%		NA	186.0-196.0' - NA		Limestone  185.7-186.0' - Same as 176.0-179.5'  186.0-196.0' - moderate yellowish brown, (10YR 5/4), medium to coarse grained, mild to moderate HCl reaction, sand to gravel-sized fragments, fossiliferous, cavities up to 3/16" over 30-50% of surface at 186.6-186.8'	-
200157.5	R21-SN 10 ft 58%		NA NR	196.0-206.0' - NA		196.0-201.8' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), strong HCl reaction, blocky partings, silt to gravel-sized limestone fragments, friable  No Recovery 201.8-206.0'	
	200.0						



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-01	SHEET	12	OF	15	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.6	55 bgs	on 3/6	6/07 START : 2/20/2007 END	): 2/22/20	007	LOGGER : R. Gomez	
≥∩ ∵	. (6			DISCONTINUITIES		L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNE	Iÿ		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
210 -167.5 - - - - - - - -172.5	R22-SN 10 ft 100%		NA	206.0-216.0' - NA			Limestone 206.0-216.0' - Same as 196.0-201.8'	
-220 -177.5 - - - - - - -182.5	R23-SN 10 ft 100%		NA	216.0-226.0' - NA			Clayey Silt (ML) 223.3-224.0' - light brown to very pale orange, (5YR 6/4 to 10YR 8/2), dry to moist, low plasticity when wet Limestone 224.0-226.0' - Same as 196.0-201.8'	
						t		
						1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-01	SHEET	13	OF	15	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.6	55 bgs	on 3/6	6/07 START : 2/20/2007 END : 2/3	22/200	D7 LOGGER : R. Gomez	
>00	(6)			DISCONTINUITIES	ပ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - 230 -187.5 - - - - - - - - -	R24-SN 10 ft i 100%	NA	NA	226.0-236.0' - NA		Limestone  226.0-233.0' - very pale orange, (10YR 8/2), fine grained, strong HCI reaction, extremely weak (R0), sand to coarse gravel-sized fragments, friable  233.0-236.0' - Same as 226.0-233.0' except increase in dark yellowish brown (10YR 4/2) silt	- - - - - - - - - - - - - - - - - - -
-192.5 	236.0 R25-SN 10 ft 1 100%		NA	236.0-246.0' - NA		236.0-246.0' - Same as 226.0-233.0'	- - - - - - - - - - - - - - - - - - -



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-01	SHEET	14	OF	15	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

				OTABLE 0/00/0007			ONLIVIATION: Ventual
WATER	LEVELS : 3.6	epa ca	on 3/6	6/07 START : 2/20/2007 END : 2/: DISCONTINUITIES		07 LOGGER : R. Gomez LITHOLOGY	COMMENTS
> 글(£)	CORE RUN, LENGTH, AND RECOVERY (%)				SYMBOLIC LOG		CONNINIENTO
DEPTH BELOW SURFACE AND ELEVATION (ft)	Ä, AN, R₹	(0)	FRACTURES PER FOOT	DESCRIPTION	길	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
FAC	E RI STH OVE	Q D (%)	FOC	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOL	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR ELE	SOR	RQI	'RA(	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Σ×	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
Волш	016	ш.	44	<u> </u>	100	Limestone	
_				-	Ė	- 246.0-255.7' - Same as 226.0-233.0'	-
_				040 0 050 01 114	₽	<u>-</u>	_
_				246.0-256.0' - NA -		<del>-</del>	_
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-212.5				_	$\vdash$		_
	256.0			-		Silt (ML)	-
_	200.0			-	Ш	\ 255.7-256.0' - grayish orange, (10YR	1
-				-	h	7/4), strong HCl reaction, unconsolidated material, silt to sand	-
-				256.0-266.0' - NA		grain-sized	-
_				-		Limestone	-
-				-	Н	_ 256.0-265.7' - Same as 226.0-233.0'	-
_				-	仜	-	-
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	R27-SN 10 ft		NA	_	H	_	
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	266.0		NR		H	No Recovery 265.7-266.0'	
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-01	SHEET	15	OF	15	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724110.3 N, 457635.3 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER LEVELS 3 85 bits on 7 8007 START 2000007 END 2020007 LOGGER R Genez    Comment					ILIVI . NOLOSOFIIC G/N GIV-110, SOFIIC, O SUIT				ONLINIATION: Vertical
DESCRIPTION  OF STAND DESCRIPTION  OF STAND	WATER	LEVELS : 3.6	55 bgs	on 3/		END : 2/2	2/20		
Bottom of Boring at 266.0 ft bgs on	>00	<u> </u>	L		DISCONTINUITIES		G	LITHOLOGY	COMMENTS
Bottom of Boring at 266.0 ft bgs on	AN E	, ND , ND , (%)		S	DESCRIPTION		Š	ROCK TYPE COLOR	
Bottom of Boring at 266.0 ft bgs on	ᆱᇰᅌ	A.A. E.A.	(%	NE			일	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
Bottom of Boring at 266.0 ft bgs on	YFA VA	RE FIGURE	) O	CTI	DEPTH, TYPE, ORIENTATION, ROUGI	HNESS,	₽	WEATHERING, HARDNESS,	SMOOTHNESS, CAVING ROD
Bottom of Boring at 266.0 ft bgs on		SOF	۵۲	-RA	THICKNESS, SURFACE STAINING, AND T	TIGHTNESS	Ϋ́		DROPS, TEST RESULTS, ETC.
SOUTH OF BOTH IN 12 PLAN TROPS ON 27227007		014					٥٫		
	_					_		Bottom of Boring at 266.0 ft bgs on	_
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PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-02	SHEET	1	OF	17

### **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

						END 9/99/9997	100055	_	ORIENTATION : Vertical
WATER	LEVELS	. 3.05 Dg	s on 3/6/0		TART : 2/23/2007	END: 2/26/2007 FOIL DESCRIPTION	LUGGER	: U.	Sump, S. Parks  COMMENTS
≥□⊋				STANDARD PENETRATION	8	OIL DESURIFIUN		၅၉	COIVIIVIEN 15
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOIL NAME III	SCS GROUP SYMBOL, COLO	NB.	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
ACE ATIO		RECOVE	ERY (ft)			NTENT, RELATIVE DENSITY		3OLI	DRILLING FLUID LOSS, TESTS, AND
FRA			#TYPE	6"-6"-6"	CONSISTENCY,	SOIL STRUCTURE, MINERAL	LOGY	YME	INSTRUMENTATION
303				(N)					W. I. I. I. I. O. IW.
42.3	0.0				<b>Topsoil</b> 0.0-1.0'		_	7/	Water level is based on Ground Water Monitoring at LNP site (FSAR Table -
					0.0 1.0			1/ 7	2.4.12.08)"
					Poorly Graded Sai				
						to medium gray, (N7 to N5) grained, with variable iron or			1
_					staining, silica sand				1
-							-		-
-							-		Water levels were not recorded for I-02
-		6.4	R1-SN				-		-
_							_		-
_							_		4
5									_
37.3					Conduc Cill (MIL)			П	_
					Sandy Silt (ML) 5.4-6.4' - vellowish	gray, (5Y 7/2), moist to wet,	low to		
					non plasticity, some	e fine to medium grain sand	ĺ		
	7.0				No Recovery 6.4-7	7.0'			
					Sandy Silt (ML)		_		1
-					7.0-9.0' - Same as	5.4-6.4'	_		1
-							-		1
-							-		1
-					9.0-15.0' - gravish v	yellow to yellowish gray, (5Y	7/2 to		-
					5Y 8/4), moist, non	plastic to low plasticity, som	ne fine –		-
10 32.3						e and gravel-size, some "cla 5', all carbonate material	ists"		
- 02.0					11 3120 at 0.0 10.0	, an carbonate material	-		-
_							-		-
_							_		_
_		10.0	R2-SN				_		_
		10.0	112 011						
							_		
-							_		1
-							-		1
15 -							-		1
15 <u> </u>					Limestone Fragme	ents With Silt		Ш	Possibly drill induced breakage
-					15.0-17.0' - fragme	ents are 1"-3" diameter, mak	ing up -	Н	
-						vith silt <50% of soil, all carb be thin limestone beds with		Ľ	-
-					interbeds)		-	H	-
-	17.0				Cilty Cand With 1 :-	mestone Fragments (SM)	_	777	-
-					17.0-22.0' - yellowi:	sh gray, (5Y 7/2), moist, fine	e to -		-
-					coarse grained, gra	ades to sandy silt with depth	, <10%		
					tine to coarse grave carbonate material	el-sized (<1/2") limestonė cl s	asts, all		_
_						-			]
									]
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PROJECT NUMBER: BORING NUMBER:

338884.FL I-

I-02

SHEET 2 OF 17

# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLING METHOD AND EQUIPMENT: Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel

ORIENTATION : Vertical

					START : 2/23/2007 END : 2/26/2007 LOGGEF	<b>Б</b> .	C. Sump, S. Parks
WAILK	LLVLLO	: 3.65 bg	3 011 3/0/0		START : 2/23/2007 END : 2/26/2007 LOGGEF SOIL DESCRIPTION		COMMENTS
종일(#)	SAMPI F	INTERVA	l (ft)	STANDARD PENETRATION	22.2.2.3	18	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
SEL(	O, uvii EE	RECOVE	` ,	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	9	DEPTH OF CASING, DRILLING RATE,
TH E		RECOVE	· , ,	011 011 011	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	9	D DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONCIOTENCY, COIL CITACOTORE, INIMERALECCI	3	n inomenment
22.3						T	
-					-	1	1
-					-	1	_
-					-	1	1
-		10.0	R3-SN		Limestone Fragments	Ė	Possibly drill induced breakage (breaks
-					22.0-23.6' - moderate yellowish brown, (10YR 5/4), 1"-3" thick fragments with 1"-2" thick light tan/gray	t	without infilling of fines)
_					silt/clay infill (possible interbeds)	╊	-
_					Silty Sand With Limestone Fragments (SM)	T	
_					23.6-27.0' - grayish orange, (10YR 7/4), fine to coarse grained, strong HCl reaction, 10-20% fine to coarse	1	1
25					gravel-sized limestone fragments (1/4"-1-1/4")	1	1. 1.
17.3					_	1	
-					-	1	1
-					-	1	1. - N
-	27.0				-	1	- - -
					Limestone Fragments	F	<b>–</b>
					27.0-29.0' - moderate yellowish brown, (10YR 5/4), 1"-4" thick fragments, fossiliferous with small	t	
					(1/16"-1/8") voids across the surface (40-60%), clay/silt on fragment faces, all carbonate derived	E	
					ciay/siit on fragment faces, all carbonate derived	┡	_  1
					Silty Sand With Limestone Fragments (SM)	1	Possibly drill induced breakage
30					29.0-31.4' - moderate yellowish brown, (10YR 5/4), fine to coarse grained, 10-15% fine to coarse		1.1
12.3					gravel-sized limestone fragments (<1" diameter), all	1	
					carbonate material	1	
						1	
		7.8	R4-SN		Limestone Fragments  31.4-31.7' - yellowish gray, (5Y 8/1), moderate HCl	╁	${ootnotesize}$
		1.0	K4-SIN		\reaction, 1" thick fragments, light gray (N7) clay	]	
					interbeds between fragments, all carbonate materials		
					\ 31.7-33.0' - moderate yellowish brown, (10YR 5/4),	F	Possibly drill induced breakage
					\ \ 10-15% fine to coarse gravel-sized limestone \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ŀ	□ 1
					Limestone Fragments	Ŀ	□ 1
35					33.0-34.8' - dark gray, (N3), fine grained, moderate HCl reaction, medium strong (R3), silt material infilling —	F	
7.3					around fragments, all carbonate materials	F	7
					No Recovery 34.8-37.0'	I	1
1 7					_	E	┧ 1
1 7	37.0					F	Ц 1
1 7					Limestone	F	<b>-</b>
1 7					37.0-39.6' - olive gray, (5Y 4/1), medium strong (R3), finer grained than above, poorly fossiliferous, fine	T	□ 1
					laminations/bedding planes visible in zones (1/8"-1/2"), horizontal partings 1"-4" spacing, light gray	F	<b></b>
1 7					to medium gray (N7 to N6) clayey infill on partings, all	F	_  1
1 7					carbonate materials	E	1
40						]	Possibly drill induced breakage
						Τ	



PROJECT NUMBER:	BORING NUMBER:					
338884 FI	I-02	SHEET	3	OF	17	

# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLIN	DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel  ORIENTATION : Vertical									
WATER	LEVELS	: 3.65 bg	s on 3/6/0	)7	START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks					
				STANDARD	SOIL DESCRIPTION COMMENTS					
A P S S	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					
H H H		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND					
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION					
2.3				(N)	Silty Sand With Limestone Fragments (SM)					
- - - - -		10.0	R5-SN		39.6-44.0 - pale yellowish brown, (10YR 6/2), fine to coarse grained, 20-50% fine to coarse grained, 20-some fragments, increasing with depth, all carbonate materials					
-45 -2.7 	47.0				Limestone  44.0-44.5' - yellowish gray, (5Y 7/2), fossiliferous (molds/casts), 50% small surface voids (1/16"-1/8") and small roughly circular solution cavities (1/2"), horizontal partings 1"-2", silty clay infilling material on partings  Silty Sand (SM)  44.5-47.0' - yellowish gray, (5Y 7/2), fine to coarse grained, 20-30% fine to coarse gravel-sized limestone fragments, decreasing with depth, all carbonate					
50 -7.7 -		6.2	R6-SN		materials  Sity Sand With Limestone Fragments (SM)  47.0-53.2' - fine to medium grained, 50-70% angular to subangular limestone fragments, full-diameter (4") limestone core pieces 2"-4" thick at 49.0-49.5' and 50.0-51.0' with thin clayey silt material on horizontal parting surfaces, all carbonate materials  Difficulty driving 6" casing to 51.0' below ground surface  Top of rock estimated to be approximately 53.0' below ground surface					
55 -12.7 - - - - - - - - - - - - - - - -					Begin Rock Coring at 53.2 ft bgs See the next sheet for the rock core log					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-02	SHEET	4	OF	17	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.6	5 bgs	on 3/6	5/07 START : 2/23/2007 END : 2/2	26/20	07 LOGGER : C. Sump, S. Parks	
>∩⊋	. (%			DISCONTINUITIES	ပ္ထ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE	E RU STH, OVEF	(%) 🛭	FOOF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ORE ENG	Ø	RAC ER I	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥMΕ	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ООШ	53.2	œ	шп		S	Limestone	Start of rock core
_	00.2			-	H	53.2-57.0' - yellowish brown to gray,	Start of rock core
-				47.0-57.0' - NA	╁	moderate to strong HCl reaction, light	-
	R6-SN			-	圧	gray silty clay interbed/infill material on horizontal parting surfaces	-
55 <u> </u>	3.8 ft	NA	NA	<del></del>	仜	— spaced 1"-2" with few up to 4",	Coring run times not
-	100%			<del>-</del>		medium yellowish brown silt (<15%) zone at 54.0-54.5', highly fragmented	recorded for I-02 -
-				-	$\vdash$	<ul> <li>56.0-57' with angular to subangular</li> </ul>	-
_				-	Ė	fragments 2"-3" in size, increasing silt sized component with depth	-
_	57.0			-	╁	Limestone Fragments	Highly fragmented Iimestone
-				-	Н	57.0-59.5' - strong HCl reaction,	Possibly drill induced _
-				57.0-67.0' - NA	仜	angular to subangular fragments 1-3" in diameter, <40% carbonate derived	breakage -
-				51.0-01.0 - NA -	士	<ul> <li>clayey silt, fines change color from</li> </ul>	-
_				-	H	light gray to moderate yellowish brown at 58.0'	_
_				-	Ħ		_
60_					Ľ	Limestone 59.5-63.0' - moderate yellowish	l
-17. <del>7</del> -				_	╙	brown, (10YR 5/4), horizontal	NA = Not Applicable NR = No Recovery -
_				_	ш	partings 1"-2" spacing with dark grayish brown clayey silt interbed	_
_				_	h	material rough and undulating, fine	_
_	R7-SN 10 ft	NA	NA	_	┢	black laminar inclusions 1/16"-1/8" in length (horizontal)	_
	100%	14/	147	_	F	L	
				_	片		
				_	⊬	63.0-64.7' - yellowish gray to olive gray, fine grained, trace to no fossils,	Possibly drill induced
						few small surface voids (1/16"-1/8"),	breakage
						horizontal partings at various spacing from 1"-8", parting surfaces mostly	
65				_	Ъп	clean with trace silty clayey material	1
-22.7						Silt (ML)	
				_	Ш	64.7-65.5' - dark brown, black mottling/laminations, possibly	1
				-	世	organics, possible bioturbation	
	67.0			-	$\vdash$	Limestone 65.5-68.1' - grayish yellow brown,	1
				<del>-</del>	F	medium strong (R3), fossiliferous,	Possibly drill induced
-				<del>-</del>	Ħ	horizontal partings with 2"-4" spacing, trace to no infill in partings,	breakage -
-				67.0-77.0' - NA	╫	surface coverage of small (<1/8")	Possibly drill induced
-				<del>-</del>	Ш	- \voids >50%	breakage -
-				<del>-</del>	⊬	Silt With Limestone Fragments (ML) 68.1-68.8' - orange gray, limestone	Repeating limestone/silt – interbeds
70				-	Æ	fragments 1/2"-1" diameter	-
-27. <del>7</del>				<del>-</del>	Ш	Limestone 68.8-70.0' - yellowish brown, fine	-
-				-	Ш	named, medium strong to strong (R3 /	-
-				-	┢	to R4), few fossils (<5%) few surface voids, dense partings 3/4"-4", light	-
-	R8-SN			-	Ħ	gray silty infilling (interbeds)	-
-	10 ft	NA	NA	<del>-</del>	Ľ	- Silt (ML)	-
-	100%			-	╀	70.0-70.5' - Same as 68.1-68.8' except strong HCl reaction	
				-	oxdot		-
			<b> </b>		1		
					<u> </u>		



PROJECT NUMBER:

33884.FL BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.6	55 bgs	on 3/6	6/07 START : 2/23/2007 END : 2/	26/200	7 LOGGER : C. Sump, S. Parks	
≳∩⊋	(%			DISCONTINUITIES	l g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 75_ -32.7 - -	77.0					Limestone 70.5-74.2' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), medium strong (R3), moderately fossiliferous — (molds/casts), 2"-8" horizontal partings, 1"-2" thick semi-indurated gray silty interbeds (dry), dry powdery interbed material at 73.0' 74.2-75.9' - dusky orange to gray, fragmented, fine sand-sized material (carbonate derived) with sparse 1/2" limestone clasts, few fine black	
	R9-SN 10 ft 93%	NA	NA	77.0-87.0' - NA		organic laminations 75.9-76.5' - dark gray, strong HCI reaction, fossiliferous, large solution cavities (1"x3"), interconnected rounded cavities (possible tube borings)  Silt (ML) 76.5-77.0' - light gray to tan, laminated  Limestone 77.0-81.5' - moderate yellowish brown, (10YR 5/4), dense, moderate HCI reaction, medium strong to strong (R3 to R4), small surface voids (1/16"-1/8") covering 40-50% surface, limestone parting	- - - - - - - -
85 -42.7 -	87.0		NR			(horizontal) 2"-6" thick, gray clayey silt interbeds, clay zone 78.5-79.6' (dark brown /black interbed laminations, vitreous luster when rubbed with hand, organic) 81.5-82.3' - pale yellowish brown, (10YR 6/2), fine grained, medium strong (R3), few small surface voids, (1/16"-1/8") (<10%), few fossils  Limestone Fragments 82.3-84.2' - moderate HCl reaction, gravel sized fragments (1/4"-1-1/2"), smaller fragments are subangular to subrounded, larger fragments	
90 -47.7 -	R10-SN 10 ft 100%		NA	87.0-97.0' - NA		angular to subangular  Limestone  84.2-86.3' - pale yellowish brown to yellowish brown, (10YR 6/2 to 10YR 5/4), small surface voids (<1/8") covering 50% of surface, 5-10% small (<1/2") roughly circular cavities, light gray silty clay infilling on horizontal partings vary from 1"-9", increasing fossils (mostly molds) with depth  No Recovery 86.3-87.0'  Disaggregated Limestone  87.0-91.4' - mottled gray/tan/brown, moderate HCI reaction, <20% limestone fragments (<3/4"), few fragments >1-1/2"	Possibly drill induced breakage



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-02	SHEET	6	OF	17	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 3.6	5 bgs	on 3/	5/07 START : 2/23/2007 END : 2/2	26/20	07 LOGGER : C. Sump, S. Parks	
≥∩≘	(%)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
ELO, I. ANI	AND 3Y (%		ZES T	DESCRIPTION	OLO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) <sub>Q</sub>	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COR	S O	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
<u> </u>						91.4-91.6' - light grayish tan, weak	_
_				-	上	(R2) - Limestone	_
_				-	上	91.6-92.7' - light yellowish gray,	_
95 <u> </u>				<del>-</del>	$\vdash$	medium strong (R3), <10% small = surface voids (1/16"-1/8"),	
				-	$\mathbf{H}$	fossiliferous Disaggregated Limestone	-
-				-	F	Disaggregated Limestone 92.7-94.4' - light grayish tan,	-
-	07.0			-	Ħ	compacted, <20% gravel size (<1") limestone fragments, dark olive	-
-	97.0			-	Ħ	<ul> <li>brown laminations (possible organics)</li> </ul>	Upward fining sequences
_				<del>-</del>	Ħ	Limestone	of increasing clay and - decreasing sand fractions
_				97.0-107.0' - NA	片	<ul><li>94.4-94.8' - Same as 91.6-92.7'</li><li>Disaggregated Limestone</li></ul>	over 4.0'-6.0' intervals
					片	94.8-97.0' - light grayish orange, few - (<10%) gravel sized (<3/4")	
				_	片	limestone fragments, dark brown	
100_				_	₽	lamination appears to transect bedding	_
-57.7	57.7				F	Limestone Fragments 97.0-107.0' - 0-25% carbonate	_
_				-	derived clay, gravel size (<1")	_	
-	R11-SN			-		limestone fragments, few fragments >1-1/2", friable fragments of slightly	-
-	10 ft	NA	NA	-		<ul> <li>more competent material are easily broken by hand, sparse dark brown</li> </ul>	-
-	100%			-	Ħ	roughly horizontal laminations	-
_				-	口	<ul> <li>associated with finer grained zones (organics)</li> </ul>	-
_				-			-
_				-		-	_
105							
-62.7				_		<del>-</del>	_
_				-	Ь	<u>-</u>	_
_				-	一	-	-
-	107.0			-	H	 107.0-117.0' - Same as 97.0-107.0'	-
-				-	F	-	-
-				107.0-117.0' - NA	F	-	-
-				-	Ħ	-	-
_				-	Ħ	-	-
110				-	廿	-	]
-67.7					片	-	
					片	_	
_				-	世	<u>-</u>	
_	R12-SN 10 ft	NA	NA	_	E	-	-
_	100%			-	₽	-	-
_				-	E	_	-
					1		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-02	SHEET	7	OF 1	7

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	VATER LEVELS: 3.65 bgs on 3/6/07		on 3/6	6/07 START : 2/23/2007 END : 2/	: 2/26/2007 LOGGER : C. Sump, S. Parks				
>00	<u></u>			DISCONTINUITIES	ى ق	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
115 -72.7 - - - - - 120 -77.7	117.0			117.0-127.0' - NA		Limestone Fragments - 117.0-127.0' - Same as 97.0-107.0'	- - - - - - - - - - - - - - - - - - -		
- - - - 125 -82.7	R13-SN 10 ft 100%	NA	NA				- - - - - - -		
	R14-SN 10 ft 100%		NA	127.0-137.0' - NA		127.0-137.0' - Same as 97.0-107.0'	- - - - - - - - -		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-02	SHEET	8	OF	17	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 3.6	35 bgs	on 3/6	5/07 START : 2/23/2007 END : 2/2	26/20	07 LOGGER : C. Sump, S. Parks	
<b>₹</b> □₽	(%)			DISCONTINUITIES	စ္က	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
135 -92.7 - - - - - 140 -97.7 - - - - - - - - - - - - - - - - - -	137.0 R15-SN 10 ft 100%	NA	NA	137.0-147.0' - NA		Limestone Fragments  137.0-139.5' - Same as 97.0-107.0'  Limestone  139.5-143.0' - very pale grayish orange, numerous (1/2"-1") solution cavities, fine black inclusions (<1/8"), variable zones of small voids (<1/16") on surface, fossiliferous, molds and casts up to 3/4" in size, dark brown staining on some of the partings (original bedding plane), mottled dark gray  143.0-145.6' - moderate yellowish brown, (10YR 5/4), strong HCI reaction, dense, less fossiliferous than above, few surface voids/cavities (<10%), horizontal partings 2"-4" spacing, 2"-3"	Fossiliferous, partial recrystallization (very fine subhedral/cross faces)
-102.7 - - - - - 150 -107.7 - -	147.0 R16-SN 10 ft 100%		NA	147.0-157.0' - NA		semi-compacted clayey silt interbeds  Disaggregated Limestone  145.6-147.0' - grayish orange brown, few gravel sized (<1/2") limestone fragments  147.0-148.9' - Same as 145.6-147.0' except increasing percent of limestone fragments and increase in size of fragments (1"-3")  Limestone  148.9-151.6' - grayish orange, (10YR 7/4), small voids (1/16"-1/8")  covering 50% surface, horizontal partings 6"-1.0' spacing, silty clay interbeds (up to 1.0"), partings thickness decreasing with depth  Disaggregated Limestone  151.6-152.3' - moderate yellowish brown, (10YR 5/4), with friable limestone fragments 3/4"-1 1/2" diameter	Repeating sequences of limestone with softer (carbonate derived) interbeds separated by zones of unconsolidated carbonates with limestone fragments (possibly drill induced breakage)



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.6	35 bgs	on 3/	6/07 START : 2/23/2007 END : 2/2	26/20	07 LOGGER : C. Sump, S. Parks	
≥0 ⊕	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-155 -112.7 -12.7             	157.0					Limestone 152.3-153.9' - Same as 148.9-151.6' Disaggregated Limestone 153.9-155.1' - grayish orange to very pale orange, (10YR 7/4 to 10YR 8/2), small (<1/2") gravel-sized limestone fragments <10% Limestone 155.1-156.0' - Same as 148.9-151.6' Limestone Fragments 156.0-157.0' - limestone fragments (60%) 3/4"-2" size, friable, with sandy silt-sized carbonates Disaggregated Limestone 157.0-160.8' - with 30-40% grayish orange limestone fragments (1/2"-1-1/2")	Possibly drill induced breakage -
-117.7 - - - - - - - - 165 -122.7	R17-SN 10 ft 93%	NA	NA			- 160.8-165.7' - Same as 157.0-160.8' except increasing amount of limestone fragments with depth (up to 40-50%), color change for limestone fragments to very pale orange (10YR 8/2)	Possibly drilling induced segregation of particles
	167.0 R18-SN 10 ft 94%		NR NA			Limestone 165.7-166.3' - dark dusky yellow, (5Y 6/4), 50% surface voids (1/16"-1/8"), fossiliferous No Recovery 166.3-167.0' Limestone 167.0-167.2' - fossiliferous, large number of solution cavities (1/2"), molds and casts 167.2-168.4' - pale yellowish gray, dense, horizontal partings, 3/4"-1" thick Limestone Fragments 168.4-168.9' - moderate yellowish brown, (10YR 5/4), carbonate derived silt to sand-sized matrix with limestone fragments 1/2"-2" in size Limestone 168.9-170.5' - Same as 167.2-168.4' except 2"-4" horizontal partings becoming large fragments at end	Material lost may have been fines from above  Repeating sequence of limestone (with interbeds) separated by zones of silty material with limestone fragments  Possibly drill induced breakage



PROJECT NUMBER:

33884.FL BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

0011110	METHOD A	ND L	VIII IV	IENT: Rotosonic S/N SR-116, sonic, 6" outer casing and	7 00	ic barrer	ORIENTATION: Vertical
WATER	LEVELS: 3.6	55 bgs	on 3/0	6/07 START : 2/23/2007 END : 2/	26/20	D7 LOGGER : C. Sump, S. Parks	
				DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	DOOK TYPE OOLOD	
SEL ON ON	N. A. Y.		FRACTURES PER FOOT	DESCRIPTION	2	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
ATE	문문	R Q D (%)	T. P. O. T.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30L	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
문유년	SSSS	g	ZAC ER	PLANARITY, INFILLING MATERIAL AND	ΥME	AND ROCK MASS	DROPS, TEST RESULTS, ETC.
	038	2	F	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	
_					ш	_ Pasty Limestone	_
					Н	170.5-171.0' - yellowish gray to orange gray, dark brown laminations	
						(possible organics), no gravel sized	Possibly drill induced breakage
475					╙	fragments	Dieakage
175 <u> </u>					łт	— Limestone	_
102.7						_ 171.0-173.9' - Same as 167.2-168.4'	_
					Н	Disaggregated Limestone  – 173.9-176.4' - brown, limestone	
						fragments generally 3/4" but up to	
-			NR	•	┺	1"-3" diameter, light gray interbeds	-
-	177.0				₽	<ul> <li>No Recovery 176.4-177.0'</li> </ul>	-
1 -					ш	Disaggregated Limestone	<b>L</b>
1					$\vdash$	177.0-177.3' - Same as 173.9-176.4' - <b>Limestone</b>	Possibly drill induced
1 7				177.0-187.0' - NA	Ľ	177.3-179.0' - yellowish gray, dense,	breakage -
1 -					ш	little to no surface voids, horizontal	-
-					$\vdash$	partings 1"-3" spacing	-
-						Limestone Fragments	_
180					Н	179.0-179.9' - moderate yellowish — brown, (10YR 5/4), fine grained, 50%	
-137.7						limestone fragments 3/4"-1-1/2" size	_
-				-	1	Limestone	-
-					╀	_ 179.9-180.9' - Same as 177.3-179.0'	-
_					Ш	except increase in small (1/16"-1/8") surface voids and soft interbeds on	_
	R19-SN 10 ft		NA		Н	_ 1"-2" partings	_
	100%	INA	INA			Disaggregated Limestone	
-					ш	180.9-183.6' - moderate yellowish	_
-					T	<ul> <li>brown, (10YR 5/4), fine grained, with limestone fragments</li> </ul>	-
_					-	-	-
_					屵	Limestone 183.6-187.0' - yellowish gray,	_
						fragmented, fragments <1/2"-3" size	
185					$\vdash$	- magmontoa, magmonto + 1/2 o oizo	
-142.7				_		_	_
-				-	₩	-	-
-						-	-
1 _					厂	 <del> </del>	_
1	187.0				$\vdash$		
1 7					ш	187.0-189.0' - fragmented, angular to	Possibly drill induced
1 -					┰	subangular, 1-1/2"-3" size	breakage -
-				187.0-197.0' - NA		-	-
1 -				101.0-101.0 - 11/1	$\vdash$	-	-
1 _				_	П	_	_
1					$\vdash$	189.0-192.0' - fossiliferous	
190				-	1	<ul> <li>(molds/casts), horizontal partings</li> <li>1"-3" spacing, very thin soft interbeds</li> </ul>	-
-147.7				_	ш	(1/2")	_
_					$\vdash$	- \ <del>-</del> \	-
_			NA				1 -
1			INA		ш		
1 7	R20-SN				1 -		Possibly drill induced
1 -	10 ft	NA		-	匚	Limestone Fragments	breakage -
-	81%			-	$\vdash$	<ul> <li>192.0-195.1' - limestone fragments,</li> </ul>	-
1 _					口	sand-sized to 1/2"-2" size	_
					1		
1							
					•		ī



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	I-02	SHEET	11	OF	17	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	WATER LEVELS : 3.65 bgs on 3/6/07		on 3/6	5/07 START : 2/23/2007 END : 2/2	2/26/2007 LOGGER : C. Sump, S. Parks				
>00	<u>.</u>			DISCONTINUITIES	ڻ ان	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
- 195 -152.7 -			NR	- - - -		- -  - No Recovery 195.1-197.0'	- - - - -		
	197.0			-	H	-	-		
- 200_	197.0			- 197.0-207.0' - NA - -		Limestone Fragments  197.0-203.3' - medium to coarse grained, grain size increasing with depth, limestone fragments are 2"-4" size, subangular to angular, fragments above 200' are fine grained, exhibit bedding plane fractures and have trace to no surface voids, fragments below	- - - - -		
-157.7 - - - -	7 - - R21-SN - 10 ft   1		NA	- - - - -		200.0' are fossiliferous (molds/casts) and exhibit 30-40% small (1/16"-1/8") surface voids and small cavities (<1/2")	- - - - -		
- 205_ -162.7 -			NR	- - - - - -		<ul> <li>Disaggregated Limestone</li> <li>203.3-204.4' - yellowish</li> <li>gray/moderate brown, 25% limestone</li> <li>fragments</li> <li>No Recovery 204.4-207.0'</li> </ul>	Lost material may be fines from across entire run		
210 -167.7 -	207.0 R22-SN 10 ft 87%		NA	207.0-217.0' - NA		Limestone Fragments  207.0-215.7' - mild HCl reaction, variable (5-15%) clay-sized pasty limestone, limestone is fine grained, fossiliferous with 1/2"-3/4" cavities, fragments are angular to subangular with smooth to irregular surfaces, 6" clayey layers at 211.0' and 215.7', silt and clay-sized carbonate content decrease with depth	Possibly drill induced breakage -		
-									



PROJECT NUMBER:	BORING NUMBER:			
338884 FI	I-02	QUEET	12 OF	17

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	WATER LEVELS: 3.65 bgs on 3/6/07		on 3/6	6/07 START : 2/23/2007 END : 2/3	26/20	D7 LOGGER : C. Sump, S. Parks	
>00				DISCONTINUITIES	ڻ ن	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 215_ -172.7 - -	217.0		NR			_ - - - No Recovery 215.7-217.0' -	- - - - - -
-225 -182.7	R23-SN 10 ft 90%	NA	NA	217.0-227.0' - NA		Disaggregated Limestone  217.0-217.5' - very pale orange and grayish orange, (10YR 8/2 and 10YR 7/4), moderate HCl reaction, laminated, dark brown organic rich layers, limestone fragments (<10%)  1/4"-1/2" in diameter  Limestone Fragments 217.5-226.0' - pale greenish yellow to very light gray, (10Y 8/2 to N8), repeating sequences of upward fining material with limestone fragments up to 3" in coarse zones, average sequence length 2.0'-2.5', limestone fragments are moderate to strong HCl reaction fossiliferous, (molds & casts), mostly subangular, few subrounded fragments	- - - - - - - - - - - - - - - - - - -
_			NR	_	Ħ	No Recovery 226.0-227.0'	_
- - - 230 -187.7 - - - -	227.0 R24-SN 10 ft 100%		NA	227.0-237.0' - NA		Limestone Fragments  227.0-235.5' - medium to coarse grained, 30-50% limestone fragments generally <3/4", few >1"  fragments, repeating/alternating zones (1'-2' length) of coarser material and finer silt zones (less fragments)	- - - - - - - - -



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-02	SHEET	13	OF	17	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.6	55 bgs	on 3/6	6/07 START : 2/23/2007 END : 2/	26/20	D7 LOGGER : C. Sump, S. Parks	
>				DISCONTINUITIES	Ŋ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
235 -192.7 - - - - - 240 -197.7 - -	237.0 R25-SN 10 ft 100%		NA	237.0-247.0' - NA		Disaggregated Limestone  235.5-236.5' - orange gray/moderate brown, contorted laminations, organics  Limestone  236.5-237.0' - light yellowish gray, fine grained, very weak (R1), thinly bedded (1/4"-1/2" thick), well developed bedding planes, appears similar to silt material  Limestone Fragments  237.0-247.0' - grayish orange and yellowish gray, (10YR 7/4 and 5Y  7/2), very fine to medium grained, moderate to mild HCI reaction, two zones with organic laminations (3"-4" thick), gravel-sized material is subangular, size varies from 1/4"-2"	
- 245 -202.7 - - - -	247.0			 247.0-257.0' - NA		247.0-255.7' - grayish orange and very pale orange, (10YR 7/4 and 10YR 8/2), mild HCl reaction, limestone fragments are sand to gravel-sized, angular, up to 3", with	- - - - - - - - - - - - - - - - - - -
250 -207.7 - - - - -	R26-SN 10 ft 87%		NA	_	- 1	zones of fragments that appear to have been possibly laminated prior to drilling	- - - - - - -
							1



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-02	SHEET	14	OF	17	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER LEVELS: 3.65 bgs on 3/6/07		on 3/6	6/07 START : 2/23/2007 END : 2/	26/20	D7 LOGGER : C. Sump, S. Parks		
>	(3			DISCONTINUITIES	U	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 255 -212.7				_		- - No Recovery 255.7-257.0' 	- -  -
	257.0		NR			- - 	-
-				257.0-267.0' - NA		Limestone Fragments - 257.0-268.5' - Same as 247.0-255.7'	-
-						-	- - -
260_ -217.7 -				_			- - -
-	R27-SN 10 ft 100%		NA			-	-
_						-	-
265_				_		_	- - -
-222.7 - -						_	-
-	267.0					-	
-				267.0-277.0' - NA		_ 268.5-271.5' - very pale orange, (10YR 8/2), mild to moderate HCl	- - -
270 <u>-</u> -227.7				-		reaction, laminated with organic layers in top 6", limestone fragments are angular to subangular, average 1/4"-1/2" size	- -
-	R28-SN					-	-
-	10 ft 100%	NA	NA			-	-



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	I-02	SHEET	15 OF 17

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.6	55 bgs	on 3/6	6/07 START : 2/23/2007 END : 2/3	26/200	D7 LOGGER : C. Sump, S. Parks	
> 0 ::	(9)			DISCONTINUITIES	Ö	LITHOLOGY	COMMENTS
ELO :: ANI	Ä, AND ∛Y (%	_ [	ZES T	DESCRIPTION	CLO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-				-	Н	Limestone Fragments 271.5-277.0' - grayish orange, (10YR	-
-				-	H	7/4), moderate to mild HCl reaction,	-
275				-	Ш	_ limestone fragment size ranges from 1/4"-4", predominately subangular	-
-232.7					Ш	with some rounded fragments,     percentage of limestone fragments	_
_				-	Ш	increases with depth	-
				-	Ш		-
	277.0				Ш		
_				_	Ш	277.0-282.0' - grayish orange, (10YR – 7/4), moderate to mild HCl reaction,	_
_				077.0.007.01.014	Ш	graded into fining up sequence 2.0'-2-1/2' thick, varies from angular	-
-				277.0-287.0' - NA -		<ul> <li>to rounded, 1/4"-4", fossiliferous with</li> </ul>	-
-				-	Н	_ molds and casts, vuggy	-
					Н	-	-
280_ -237.7				<del>-</del>	H	<del></del>	
-				-	H	-	-
_			NA	-	Ħ	=	-
	R29-SN	29-SN 10 ft   NA			H	_	
	87%	INA			H	282.0-285.7' - very light gray, (N8), moderate to mild HCl reaction, some	
_				- - - -	H	organic laminations in upper 0.5',	-
_					H	predominately angular to subangular, fossiliferous, 1/4"-1" average size, some fragments up to 2", thin layer of limestone fragments at 285.0', laminated up to 2"	-
-					H		-
					H		-
285 <u>-</u> -242.7				<del>-</del>	Ш	<del></del>	
-				-	Ш	- No Recovery 285.7-287.0'	-
1 -			NR	-	Ш	_ 140 Necovery 203.7-207.0	-
	287.0			_	Н	-	-
					Н	Disaggregated Limestone  – 287.0-297.0' - yellowish gray with	Note: Using 20.0' core barrel to increase sample -
-				207.0.207.01. NA	Н	very pale orange and dark gray	depth beyond bottom of 6"
-				287.0-297.0' - NA -	Н	mottling, (10YR 8/2 and N3), 1/4" – average size	casing (302.0')
-				-	Ш	-	-
				-	Ш	-	-
290_ -247.7				_	Ш	<del></del>	-
-				-	Ш	-	-
-				-	Ш	-	· -
			NIA	-	Ш	_	-
			NA		Ш	_	]
_				_	Ш	_	_
1		I					



PROJECT NUMBER:	BORING NUMBER:				
338884.FI	I-02	SHEET	16 OF 17		

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	TER LEVELS: 3.65 bgs on 3/6/07		on 3/6	6/07 START : 2/23/2007 END : 2/	26/20	D7 LOGGER : C. Sump, S. Parks			
>00	G	。 <b></b>		DISCONTINUITIES		LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
295 -252.7 - - - - - 300 -257.7	R30-SN 15 ft <sup>1</sup> 67%		NR	297.0-307.0' - NA		No Recovery 297.0-302.0'			
305 -262.7	302.0		NA			Limestone Fragments  302.0-302.75' - Same as 287.0-297.0' 302.75-305.75' - grayish orange, (10YR 7/4), moderate to mild HCl reaction, limestone, size ranges from 1/4"-2", subangular, crystalline quartz grains found throughout column  305.75-306.5' - very pale orange and dusky blue green, (10YR 8/2 and 5BG 3/2), very little to reaction with HCl without scratching the surface, angular to subangular ingestone	Note: Using 20.0' 4" cave barrel to sample material beyond 6" casing depth (302.0') 1st attempt failed to recover material (fell out during retrieval) 2nd attempt with flapper bit successful although sample is disturbed		
310 -267.7 -	R31-SN 15 ft i 30%		NR	307.0-317.0' - NA		angular to subangular limestone No Recovery 306.5-317.0'	- - - - - - - - -		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-02	SHEET	17	OF	17	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724046.5 N, 457700.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	WATER LEVELS: 3.65 bgs on 3/6/07			START : 2/23/2007 END : 2/26/20		200	7 LOGGER: C. Sump, S. Parks				
	<u>-</u>			DISCONTINUITIES	,	ים	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTS	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND HICKNESS, SURFACE STAINING, AND TIGHTNESS  DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS		SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.				
315 -272.7 -	CORE R LENGTH RECOVER	() A O D ()	FRACTU PER FOI	DEPTH, TYPE, ORIENTATION, ROUGHNESS PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHT!	S,   \$\frac{1}{9\cdot \c		WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  Bottom of Boring at 317.0 ft bgs on 2/26/2007  Bottom of Boring at 317.0 ft bgs on 2/26/2007	Total depth of boring is  317.0'  Total depth of boring is			



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-03	SHEET	1	OF	14

# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLIN	GMEIH	OD AND	EQUIPIVI	ENT: Rotosonic	S/N SR-116, sonic, 8	surface casing, 6" outer c	asing and 4" core	barrei	ORIENTATION : Vertical
WATER	LEVELS	: 2.0 ft bo	gs on 3/2	1/07	START : 3/21/2007	END: 3/23/2007	LOGGE	R : C.	Sump, J. Burkard
>00				STANDARD PENETRATION		SOIL DESCRIPTION		<b>_</b>   g	COMMENTS
N (#	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOIL NAME	USCS GROUP SYMBOL	COLOR	O LC	DEDTH OF CASING DRILLING DATE
A B B B A B B B B B B B B B B B B B B B		RECOVE	ERY (ft)		MOISTURE C	CONTENT, RELATIVE DE	ENSITY OR	Š	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	CONSISTENC	Y, SOIL STRUCTURE, MI	INERALOGY	SYMBOLIC LOG	INSTRUMENTATION
<u> 42.1</u>	0.0			(N)	Poorly Graded S	Sand (SP)		0)	Start drilling 12:32
-	0.0				0.0-3.0' - fine to r	medium grained, no HC		-	Set 8" casing -
-						5YR 2/1) and organic rigrading to pale brown (		-	0-27' below ground surface
-					dark yellowish br	own (10YR 4/2) between	en 2.0-3.0'	-	-
-								-	Water level: 2 ft below ground surface
-								-	-
-		5.4	R1-SN		Clayey Sand (SC	2)		1//	-
-					3.0-6.0' - mediun	n plasticity, no HCl read		- 1///	-
-						/ laminated with dark ye 6) layers and light gray		- ///	-
						., .,	( ) - 3	1///	-
5 37.1							-	- ///	R1: 2 minutes
-								- 1///	-
-	6.0				Silt With Sand (I	ML)		<b>- K</b>	-
-					6.0-16.0' - grayis	h orange, (10YR 7/4), r	mild to strong	$\parallel \parallel$	-
-						y fine to fine sand-sized fragments at 15.8, cart		1111	-
_					materials			1111	-
_								1	-
-								1	-
-								1111	-
10 -								1111	-
10 32.1							-	1111	
-								1111	-
-		10.0	R2-SN					1	-
-								1	-
-								1111	-
-								1	-
-								1111	-
-								1111	-
-								1111	-
15								1111	-
27.1							-	1111	R2: 10 minutes
-	16.0							1	5 bolts sheared off on drill head. Down for
-	10.0				Limestone			₩	maintance 12:55-15:13 (2:18)
-					16.0-17.5' - very	pale orange, (10YR 8/2 . Fossils exhibit prefere	2), fossiliferous	+	-
1 -					horizontal orienta	ation (bedding plane), fe	ew large	1	-
-					molds (3/4"), nur	nerous small voids (3/8 ace. Horizontal partings	" to 1-3/16")		-
1 -					\clay/silt interbeds	s up to 2" thick, partings	s may be	1	-
1 -					\mechanical brea	ks		1	-
1 -								1	-
20								1	-
1									



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	I <b>-</b> 03	CHEET	2 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS	: 2.0 ft bo	gs on 3/21	1/07 S	START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard
				STANDARD	SOIL DESCRIPTION © COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	RECOVE	. ,	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
DEPTI SURF,			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
22.1		8.6	R3-SN	,	Silty Sand With Limestone Fragments (SM)  17.5-24.6' - very pale orange, (10YR 8/2), fine-coarse sand-sized materials and variable fines content ranging from <5% to >15%. Limestone fragments are similar to limestone above and are subangular to subrounded in shape. Most fragments <0.5" with few large fragments >2" on 2.0-3.0' spacing (thin beds)
25 17.1	26.0				No Recovery 24.6-26.0'
-	20.0				Silty Sand And Limestone Fragments (SM) 26.0-27.2' - Same as 17.5-24.6'  Drill induced breakage
30 12.1 - - - - - - - - - - - - - - - - - - -		10.0	R4-SN		Limestone 27.2-28.1' - Same as 26.0-27.2 except thin beds (1-2" thick) with clay/silt interbeds (1-1/2" thick)  Silty Sand And Limestone Fragments (SM) 28.1-36.0' - moderate yellowish brown, (10YR 5/4), fine to coarse sand-sized materials, 20-40% fine to coarse gravel-sized limestone fragments, range from 3/4"-1-1/2" with few >2"  R4: 12 minutes  Begin Rock Coring at 36.0 ft bgs See the next sheet for the rock core log
- - -					See the next sheet for the rock core log
40					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-03	SHEET	3	OF	14	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 2.0	ft bgs	on 3/	21/07 START : 3/21/2007 END : 3/	23/200	DOT LOGGER : C. Sump, J. Burkard	_
>00	<u>.</u>			DISCONTINUITIES	O	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - -	36.0			36.0-46.0' - NA		Limestone Fragments  36.0-39.6' - with horizontal partings (2-4" spacing) with clayey silt interbeds/infilling on partings (1/4"-3/4" thick)	- - - - -
40	R5-SN 10 ft 89%	NA	NA			Silt (ML)  39.6-41.0' - moderate yellow brown, (10YR 5/4), mild to moderate HCI reaction  Well Graded Limestone Fragments With Sand 41.0-43.0' - limestone fragments <1". At 41.0' large, irregularly shaped limestone fragment (5")  Limestone 43.0-44.9' - Same as 36.0-39.6' except with very thin clayey silt infilling on horizontal parting surfaces (bedding planes)	NA = Not Applicable NR = No Recovery
-2.9 -			NR			The No Recovery 44.9-46.0'	R5: 13 minutes
50 -7.9 -	R6-SN 10 ft 96%	NA	NA	46.0-56.0' - NA		Limestone And Limestone Fragments 46.0-56.0' - Same as 41.0-44.9' except on 1.5-2.0' spacing with well graded gravel (limestone fragments) with silt and sand (GW-GM) interval in between, very thin clayey silt similar to 41.0-44.9' above	
55 -12.9 	56.0		NR	_		- No Recovery 55.6-56.0'	R6: 14 minutes



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-03	SHEET	4 0	F 1	4

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

Page   Page		LITHOLOGY	l l	DISCONTINUITIES			(9	>00
Section   Sect	FLUID LOSS, CORING RATE ANI SMOOTHNESS, CAVING ROD		υ					
S6.0-S8.3* very pale crange, (10YR   S6.0-S8.3* very pale crange, (10YR   S7.5 sasiliferous limestone (moids/casts), voids (1/16*-1/8*) over 20-30% of surface, horizontal partings on 2-6* spacing (bedding plane), with 1-2* clayer, sitly (low to orderate plasticity) interfects with vision of the control		MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SYMBOLIC LO	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	FRACTURES PER FOOT	Ø	CORE RUN, LENGTH, AND RECOVERY (%	DEPTH BELOV SURFACE ANI ELEVATION (ff
Contract   Contract	") over ing bw to with hts <1"	56.0-58.3' - very pale orange, (10YR 8/2), fossiliferous limestone (molds/casts), voids (1/16"-1/8") over 20-30% of surface, horizontal partings on 2-6" spacing (bedding plane), with 1-2" clayey, silty (low to moderate plasticity) interbeds with gravel-sized limestone fragments <1"/  Calcareous Silt With Limestone Fragments (ML) 58.3-60.0'  Limestone 60.0-61.4'  Limestone Fragments		56.0-66.0' - NA	NA	NA	R7-SN 10 ft 100%	
75 -32.9 NR	Core run times not recorded below R7-SN	66.0-68.6' - medium to coarse grained, voids (<1/16") over 80% of surface  Limestone Fragments 68.6-70.1'  Limestone 70.1-71.5'  Limestone Fragments 71.5-72.5'  Disaggregated Limestone 72.5-74.5' - contains limestone		66.0-76.0' - NA		NA	R8-SN 10 ft 85%	-27.9 - - - - - - - - - 75



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-03	SHEET	5	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 2.0						
≥0.0	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - -				76.0-86.0' - NA - - -		Limestone 76.0-79.0' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, discs up to 3" in length with interbeds of silt and gravel-sized fragments with voids over 10% of surface	- - - -
80_ -37.9	R9-SN			- - - -		79.0-81.0' - Same as 76.0-79.0' except limestone fragments with increased fines and interbeds of clay and sand-sized particles	- - - -
- - -	10 ft 100%	NA	NA	- - -		81.0-82.5' - pale yellowish brown, (10YR 6/2), moderate HCl reaction	- - -
- -				- -		82.5-83.7' - gravel-sized limestone fragments with silt size fines	]
- 85_ -42.9				- - -		_ 83.7-86.0' - moderate yellowish brown, (10YR 4/2), moderate HCl reaction, 4" limestone fragments with voids over 60-75% of surface, poorly fossiliferous	- - - -
- - -	86.0			86.0-96.0' - NA -		86.0-88.0' - Same as 83.7-86.0' - except 2" fragments	- - -
- - - 90_ -47.9				- - -		Limestone Fragments  - 88.0-88.8' - Same as 86.0-88.0' except gravel-sized fragments 88.8-90.3' - Same as 83.7-86.0' except with black organic matter (1-1/2"- 1/2" spacing)	- - - -
-	R10-SN 10 ft 100%		NA	- - - -		Limestone Fragments With Clay     And Sand     90.3-92.4' - yellowish gray, (5Y 7/2),     strong HCl reaction, fragments are     gravel-sized	- - -
-				- - -		Limestone Fragments 92.4-95.0' - very pale orange, (10YR 8/2), strong HCl reaction, limestone disc up to 5" in length with thin clay interbeds, trace voids on surface, apparent non-fossiliferous, rock is dry and powdery	- - - - -
95 <u> </u>	96.0			-		95.0-96.0' - Same as 92.4-95.0' - except with thin beds of dry lean clay	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-03	SHEET	6	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

MINERALOGI, TEXTURE, STUDIO DEPTH, TYPE, ORIENTATION, ROUGHNESS, WEATHERING, HARDNESS, SMOOTHNESS, CAVING ROD	WATER	LEVELS: 2.0	ft bgs	s on 3/	21/07 START: 3/21/2007 END: 3	23/200	COMPANY OF THE STREET OF THE S	
98.0-106.0" - NA    Disaggregated Limstone   60.0-106.0" - very pale orange,   (10YR 8/2), strong HCl reaction, with   earn clay interbedding and isolated   20.40%, lean clay at 99.0-99.8" and   103.0-106.0"	<b>≩</b> □ <i>≨</i>	(%				၅	LITHOLOGY	COMMENTS
98.0-106.0" - NA    Disaggregated Limstone   60.0-106.0" - very pale orange,   (10YR 8/2), strong HCl reaction, with   earn clay interbedding and isolated   20.40%, lean clay at 99.0-99.8" and   103.0-106.0"	DEPTH BELO' SURFACE AN ELEVATION (f	CORE RUN, LENGTH, AND RECOVERY (	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
110 -67.9 - R12.SN 10 ft 100% NA NA 115 -72.9	-100 -57.9 	R11-SN 10 ft			96.0-106.0' - NA		<ul> <li>96.0-106.0" - very pale orange,</li> <li>(10YR 8/2), strong HCl reaction, with lean clay interbedding and isolated</li> <li>limestone disc, moderately moist,</li> <li>20-40% lean clay at 99.0-99.8' and</li> </ul>	_
	-67.9 - - - - - - - - - - - - - - - - - - -	R12-SN 10 ft 100%		NA	106.0-116.0' - NA		106.0-116.0' - very pale orange, (10YR 8/2), strong HCl reaction	_



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-03	SHEET	7	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WAILIN	LEVELS : 2.0	) ft bgs	s on 3/	21/07 START : 3/21/2007 END : 3/	<u>23/20</u>	D7 LOGGER : C. Sump, J. Burkard	_
≥∩≘	- (9			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R13-SN 10 ft 100%	NA	NA	116.0-126.0' - NA		Disaggregated Limestone 116.0-126.0' - Same as 106.0-116.0'	
	126.0 R14-SN 10 ft 1 85%		NA NR	126.0-136.0' - NA		126.0-134.3' - very pale orange, (10YR 8/2), strong HCl reaction, interbedded limestone discs and fragments, locally moist and dry sections	
	136.0				╫		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-03	SHEET	8	OF	14

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

				ILIVI . Notosofiic 5/14 GIV-110, sofiic, b' surface casing, c			ONENTATION : Vehical
WATER	LEVELS : 2.0	tt bgs	s on 3/		23/200		COMMENTO
ŞQ£	(%			DISCONTINUITIES	LOG	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
AGE	B.F.Ä	(%) О	78	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	OL!	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
F F S	ORE ING	Oρ	SAC ER F	PLANARITY, INFILLING MATERIAL AND	SYMBOLIC	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	CC CC LE RE	Я	FB	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	2.10. 0, 1201 1200210, 210.
				136.0-146.0' - NA		Limestone Fragments	
_				-	т	<ul> <li>136.0-139.4' - yellowish gray, (5Y 7/2), strong HCl reaction,</li> </ul>	<b> </b>
-				-	$\Box$	gravel-sized fragments	-
-				-	H	-	-
-				-		_	_
_				<u>-</u>		_	_
				_	$\vdash$	_	_
140				_	Ш	139.4-142.3' - moderate brown, (10YR 6/2), strong HCl reaction,	_
-97.9						limestone fragments up to 2" in	
-	R15-SN		NA	-	$\vdash$	length with little to no fines, with	-
-	10 ft			-		worm holes that contain pyrite, fine grained, moderately fossiliferous	
-	93%			-	Н	grained, moderately lossilierous	-
-				-	Ш		_
_				_	Н	- 142.3-143.6' - gravel-sized rock	_
						fragments up to 2" in diameter with	
				_	Ш	thin clay coating	]
_				-		- Limestone	SC-1 collected at 144.2-
-				-	Н	143.6-146.0' - yellowish gray, (5Y	145.3'
				-		- 7/2), 13" long with no fines, voids	-
145_ -102.9					₩	over 50-75% of surface, fine grained, poorly fossiliferous	
-102.9			ND	-		- No Recovery 145.3-146.0'	_
_	146.0		NR	_	Н	_	_
				146.0-156.0' - NA		Limestone Fragments - 146.0-148.0' - yellowish gray, (5Y	
						7/2), strong HCl reaction, fragments	
				_	ш	are gravel-sized	1
-				-		_	_
-				-	Н	_ 148.0-149.5' - dusky yellow, (5Y 6/4),	-
-				-		<ul> <li>strong HCl reaction, fragments are</li> </ul>	-
-				-	Н	gravel-sized, silica sand present	-
_				-			_
150					Н	Limestone — 149.5-152.9' - pale yellowish brown,	
-107.9					戸	(10YR 6/2), fine grained, strong HCl	
1 7	R16-SN				Ш	reaction, limestone core segment	]
1 7	10 ft 100%	NA	NA	_	Щ	<ul> <li>with interbedded clay lenses 1/8" to 2" thick, poorly fossiliferous</li> </ul>	1
-	.5570			-	Ш	, p,	1
-				-	$\vdash$	<u></u>	-
-				-	口	_	-
-				-	Н	Limestone Fragments	-
-				-	Ш	_ 152.9-156.0' - dusky yellow, (5Y 6/4),	_
1 4				_	Н	strong HCl reaction, fragments are gravel-sized, silica sand present	_
					口	graver-sized, silica sand present – 154.3-156.0' - pale yellowish brown,	
155					$\vdash \vdash$	(10YR 6/2), strong HCl reaction,	]
-112.9				_	Ш	limestone core segment up to 5" in	
-	156.0			-	$\Box$	<ul> <li>length with interbedded clay, poorly fossiliferous</li> </ul>	-
	156.0					i cominerous	-
1							



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-03	SHEET	9	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

				ILIVI . INClusionic 5/14 ON-110, 30/110, 0 Surface casing, C			ONENTATION: Vertical		
WATER	LEVELS : 2.0	) ft bgs	s on 3/		23/200		COMMENTO		
ŠQ€	CORE RUN, LENGTH, AND RECOVERY (%)			DISCONTINUITIES	ဗ္ဂ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	N, AN[ ₹Y (	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
H BI ATIC	E.R.U.	Q D (%)	Ţ.	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	l l	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND		
FF 등	ORE ECC	αD	AAC ER F	PLANARITY, INFILLING MATERIAL AND	₩.	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
SE	SHR	22	H H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS			
				156.0-166.0' - NA		Disaggregated Limestone			
				_	ш	<ul> <li>156.0-163.7' - yellowish gray, (5Y</li> <li>7/2), strong HCl reaction, contains</li> </ul>	_		
-				-	Н	isolated limestone fragments up to 3"	-		
-				-	Ш	in diameter	-		
_				-	Ш	_	-		
_				-	Ш	_	-		
_				_	Н	_	_		
				_	Ш	_	_		
160					Н				
-117.9					Ш		_		
1 1	R17-SN			-	Н	_	-		
-	10 ft 100%	NA	NA	-	曰	-	-		
-	100%			-	Ш	-	-		
_				-	Ш	-	-		
_				-	Ш	_	-		
_				<u>-</u>	Н	_	_		
				_		_	_		
					Н	Limestone			
						_	Ш	163.7-166.0' - dusky yellow, (5Y 6/4),	_
165				•	H	fine grained, strong HCl reaction, limestone fragments up to 1" in	-		
-122.9						length with interbedded silty sand,			
-	100.0			1	Ш	poorly fossiliferous	-		
-	166.0			166.0-176.0' - NA	₽₽	Limestone Fragments	-		
_				-	Ш	<ul> <li>166.0-168.9' - yellowish gray, (10YR)</li> </ul>	-		
_						-	Н	6/2), fine grained, strong HCl reaction, up to 3" in length with no	-
_				-		- fines, moderately fossiliferous, voids	_		
				_	Ш	over 25-50% of surface	_		
				_	Ш	_	_		
							Possible rip-up clast at -		
				_	Н	Disaggregated Limestone 168.9-170.5' - grayish orange, (10YR	168.8'		
170				-	ш	7/4), strong HCl reaction	-		
-127.9					H				
-	R18-SN			-	囯	Limestone	-		
-	10 ft		NA	-	Ш	- 170.5-172.3' - pale yellowish brown,	-		
-	100%			-	$\square$	_ (10YR 6/2), moderate HCl reaction, with limestone discs up to 4" in	-		
1 4				-	丗	<ul> <li>length with thin interbeds of clay,</li> </ul>	-		
1 4				<u>-</u>	₽	voids over 20-40% of surface	-		
				_	Щ	Disaggregated Limestone 172.3-173.5' - dusky yellow, (5Y 6/4),	_		
					Н	strong HCl reaction			
1 7				_	П	Limestone	·		
1 1				-	버	- 173.5-176.0' - Same as 170.5-172.3'	-		
175				-	Ш	-	· -		
175 <u>-</u> -132.9				_	団	<del></del>	_		
1 -				-	$\square$	-	-		
	176.0				H		-		
1							I		



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	I_03	QUEET	10 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 2.0	) ft bgs	s on 3/	21/07 START : 3/21/2007 END : 3/	23/20	D7 LOGGER : C. Sump, J. Burkard		
≥ ∩ ⊕	(9)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS	
N (#	A'N YAND %		ES T	DESCRIPTION	C LO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.	
				176.0-186.0' - NA		Limestone Fragments - 176.0-181.0' - light olive gray to		
_					oxdot	vellowish grav. (5Y 5/2 to 5Y 7/2).	_	
-					F	fine grained, strong HCl reaction, 4" in length, poorly fossiliferous, voids	-	
-						over 10-20% of surface	-	
-					H	-	-	
-						<del>-</del>	-	
180					_	H	_	_
-137 <u>.9</u> -	R19-SN				片	-	_	
-	10 ft 100%		NA		H		-	
-	100%				Ħ	<ul> <li>181.0-182.1' - yellowish gray, (5Y 7/2), moderate HCl reaction</li> </ul>	-	
-				Ħ	182.1-183.6' - moderate yellowish	-		
						Ħ	brown, (10YR 5/4), strong HCl reaction	
_					Ħ		_	
-							H	Limestone 183.6-186.0' - pale yellowish brown,
185					Ħ	<ul> <li>(10YR 6/2), strong HCl reaction, discs up to 3" in length with</li> </ul>	-	
-142.9				_	F	interbedded clays 1/8" to 1" thick, highly fossiliferous with voids over		
	186.0					30-60% of surface	_	
_			186.0-196.0' - NA	186.0-196.0' - NA		Disaggregated Limestone 186.0-196.0' - yellowish gray, (5Y	-	
-							$\pm$	7/2), mild to moderate HCl reaction, limestone fragments throughout 10'
-						<ul> <li>section, 60-80% limestone fragments from 186.0-188.8', decreases with</li> </ul>	-	
-					┢	depth to <10% from 192.0-196.0'	-	
						_	_	
-					口	-	_	
190 <u>-</u> -147.9				_	$\perp$	_		
-	R20-SN				堙	-	-	
-	10 ft 100%	NA	NA		F	-	-	
						_	_	
_					$\perp$	-	_	
-					臣	_	-	
-					臣	-	-	
-					世	-	-	
195					$\vdash$	_		
-152.9 -					片	-	-	
-	196.0				$\vdash$			



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-03	SHEET	11	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 2.0	ft bgs	s on 3/	/21/07 START : 3/21/2007 END : 3/2	23/20	D7 LOGGER : C. Sump, J. Burkard		
>00	<u></u>			DISCONTINUITIES	G	LITHOLOGY	COMMENTS	
ANE (#	ZAN ZAND ZAND		ËS T	DESCRIPTION	SLO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,	
H BE	E RU STH,	Q D (%)	TUR FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI(	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQE	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.	
20,2	014			196.0-206.0' - NA	J.	Limestone Fragments		
-				-	$\vdash$	<ul> <li>196.0-199.7' - yellowish gray, (5Y 7/2), fine grained, mild to moderate</li> </ul>	-	
-	-			-	F	HCl reaction, vary from 2"-5" in	-	
-				-	F	<ul> <li>length and discs 1/8" to 2-1/2" in diameter</li> </ul>	-	
-				-	H	_	-	
					Ħ	_		
_						Ħ	_	_
200_			NA	<del>-</del> -	H	Disaggregated Limestone		
-157 <u>.</u> 9	DO4 ON			-	H	199.7-203.0' - grayish orange, (10YR 7/4), mild to moderate HCl reaction,	_	
-	R21-SN 10 ft			-	L	_ fragments with voids over 50-70% of surface	-	
-	80%			-	Ш	-	-	
-				-	⊬	-	-	
-				-	$\vdash$	-	-	
-				-	匚	Limestone Fragments	-	
-	1			203.0-204.0' - moderate yellowish brown, (10YR 5/4), strong HCI	-			
					Ш	reaction, fragments are gravel-sized, up to 1/2" in diameter		
205_			NR		Д	No Recovery 204.0-206.0'		
-162 <u>.9</u> -				<u>-</u>	口	_	_	
_	206.0			206.0-216.0' - NA	団	Limestone Ereamente	-	
-				200.0-210.0 - NA	団	Limestone Fragments  – 206.0-207.0' - yellowish gray, (5Y	-	
-				-	$\vdash$	7/2), very fine to fine grained, mild HCl reaction, poorly fossiliferous	-	
_				-	Ш	<ul> <li>Disaggregated Limestone</li> <li>207.0-216.0' - yellowish gray, (5Y</li> </ul>	-	
-				-	$\vdash$	7/2), mild to strong HCl reaction,	-	
-	-			-	$\vdash$	<ul> <li>gravel-sized fragments up to 1" in diameter, subrounded to subangular</li> </ul>	-	
-				-	Н	_ ,	-	
210				_	F	_	_	
-167.9 -				_	F	_	_	
_	R22-SN 10 ft		NA	-	Ħ	_	-	
_	100%			-	F	_	-	
_				-	Ħ	_	-	
-				-	Ħ	-	-	
-				-	片	-	-	
-				-	Ħ	-	-	
-				-	$\vdash$	<b>-</b>	-	
215	]			-	dash		_	
-172.9 -	]				H	_		
	216.0				oxdot			



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	I <u>-03</u>	SHEET	12 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER I	LEVELS : 2.0	ft bgs	on 3/	21/07 START : 3/21/2007 END : 3/	23/200	7 LOGGER : C. Sump, J. Burkard	
≥∩≘	- (°			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
220 -177.9 - - - - - - - - - - - - - - - - - - -	R23-SN 10 ft 100%		NA	216.0-226.0' - NA		Disaggregated Limestone  216.0-233.0' - yellowish gray, (5Y 7/2), moderate to strong HCI reaction, subangular to angular gravel-sized fragments up to 1" in diameter, limestone fragments up to 3" in diameter at 220.0-220.7', pale greenish yellow (10YR 8/2), fine grained, strong HCI reaction	- - - - - - - - - - - - - - - - - - -
230 -187.9 - - - - - - - - - - - - - - - - - - -	R24-SN 10 ft 85%		NA NR	226.0-236.0' - NA		Limestone Fragments  233.0-234.5' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, fragments are gravel-sized No Recovery 234.5-236.0'	
-	236.0				H	-	



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	l I-03	SHEET	13	OF	14	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

型点   変   き   き   さ   DEPTH, TYPE, ORIENTATION, ROUGHNESS, USE OF THE PROPERTY OF THE PROPE	WATER	LEVELS : 2.0	ft bgs	on 3/	21/07 START : 3/21/2007 END : 3/	23/20	D7 LOGGER : C. Sump, J. Burkard	
240 -197.9 R25-Sh 10 ft   NA 100% NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  250.0-260.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  250.0-256.0' - NA  260.0-256.0'	≥∩≘	. (°			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
240 -197.9 R25-Sh 10 ft   NA 100% NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  250.0-260.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  246.0-256.0' - NA  250.0-256.0' - NA  260.0-256.0'	DEPTH BELOV SURFACE ANI ELEVATION (f	CORE RUN, LENGTH, AND RECOVERY (%	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY. INFILLING MATERIAL AND	SYMBOLIC LC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
250 -207.9 -286.0-256.0' - NA  246.0-256.0' - NA  Disaggregated Limestone 246.0-254.6' - Same as 236.0-246.0'  Limestone Fragments -249.5-254.6' - fine grained, mild HCl reaction, non fossiliferous -250.8-254.6' - mild HCl reaction, highly fossiliferous limestone fragments with voids over 60-80% of surface  NR  NR  NR  NR		R25-SN 10 ft l	NA	NA	236.0-246.0' - NA		<ul> <li>236.0-246.0' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCI reaction, fine-grained limestone fragments, subrounded to</li> </ul>	
250.0	250 -207.9 - - - - - - - - - - - - - - - - - - -	R26-SN 10 ft 86%			246.0-256.0' - NA		Limestone Fragments  249.5-254.6' - fine grained, mild HCl reaction, non fossiliferous  250.8-254.6' - mild HCl reaction, highly fossiliferous limestone fragments with voids over 60-80% of surface	_
		256.0				Ħ		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	l I-03	SHEET	14 OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723978.8 N, 457771.7 E (NAD83)

ELEVATION: 42.1 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 2.0	ft bgs	s on 3/	21/07 START : 3/21/2007 EN	D: 3/23/	200	7 LOGGER : C. Sump, J. Burkard	
≥∩ ∷	(9)			DISCONTINUITIES		و ا	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A BE	RUI TH, /	R Q D (%)	TUR 00	DEPTH, TYPE, ORIENTATION, ROUGHNESS	;		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS. CORING RATE AND
I HA	ORE ENG	Oρ	SAC ER F	PLANARITY. INFILLING MATERIAL AND	" [50]	Z MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
E S E	SHR	œ	F E	THICKNESS, SURFACE STAINING, AND TIGHTN	IESS (	ĺς.	CHARACTERISTICS	5.16. 6, 120. 112.02.16, 2.16.
				256.0-266.0' - NA		Ц	Limestone Fragments - 256.0-266.0' - Same as 249.5-254.6'	
						Ц	200.0-200.0 - Gaine as 240.0-204.0	
						П		
					1	Н	-	1
					1	I	-	1
-						Ⅎ	-	1
_					1	Ц	-	1
260					1	Ц	-	1
-217.9					1	╛	_	_
-	R27-SN				+	╁	-	1
-	10 ft		NA		+	1		-
-	100%				Ł	Н	-	-
-					+	4	-	-
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-						Т	-	-
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265_						Ц		
-222.9						Ц	_	_
	266.0					╛		
							Bottom of Boring at 266.0 ft bgs on 3/23/2007	
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-04	SHEET	1	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLING METHOD AND EQUIPMENT: Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel

ORIENTATION: Vertical

					START : 2/02/2007 FAID : 2/04/2007 LOCCED : A Teel C Curre	_
WATER	LEVELS	: 1.0 ft bo	S UH 3/23		START: 3/23/2007 END: 3/24/2007 LOGGER: A. Teal, C. Sump  SOIL DESCRIPTION COMMENTS	$\neg$
<b>≥</b> 9€	SVMDLE	INTERVA	I (ft)	STANDARD PENETRATION	O O O O O O O O O O O O O O O O O O O	$\dashv$
ELC ON (	SAMPLE			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	
DEPTH BELOW SURFACE AND ELEVATION (#)		RECOVE	_ ` `		MOISTURE CONTENT, RELATIVE DENSITY OR │ 🧖 │ DRILLING FLUID LOSS, TESTS, AND	
SUR!			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	
41.6	0.0			(/	Poorly Graded Sand (SP)	┪
-					0.0-4.0' - moderate yellowish brown, (10YR 5/4), trace fine gravel, fine to medium silica sand to 1/16", trace	1
-					fines, trace organics, color varies to dark yellowish	+
-					orange (10YR 6/6) between 1.0-2.0' , dusky yellow	$\exists$
-					(5Y 6/4) between 2.0-4.0'	+
-					<u>-</u>  ∴	$\exists$
-		6.0	R1-SN		-4	$\dashv$
-					<u>-</u>  ∴	4
-					Sandy Lean Clay (CL)	4
-					4.0-5.0' - pale olive, (10Y 6/2), moist, soft, low to	4
5 36.6					medium plasticity, slow to rapid dilatancy, no HCl reaction, 30-35% very fine to fine silica sand R1: 3 minutes	4
-					Silt (ML)	4
-	6.0				5.0-6.0' - grayish yellow, (5Y 8/4), wet, stiff,	4
-					nonplastic, rapid dilatancy, moderate HCl reaction, 10% very fine sand-sized sand, carbonate materials	4
-					6.0-7.9' - Same as 5.0-6.0'	┨
_					4	4
_					Limestone	4
-					7.9-9.9' - dusky yellow, (5Y 6/4), medium grained,	4
_					mild HCl reaction, very weak (R1), moderately cemented, 60% coverage of small voids	4
_						4
10					Silt (ML)	4
31.6					9.9-16.0' - Same as 4.0-5.0' except small 1-2" thick	4
_		10.0	R2-SN		sections of limestone	4
_					4	4
_					4	4
_					<u> </u>	4
_					<u> </u>	4
_					<u> </u>	4
					<b></b>	1
					<b></b>	1
15						$\exists$
26.6					R2: 7 minutes	╛
	16.0				<u> </u>	
					16.0-26.0' - Same as 5.0-6.0' except strong HCl reaction, limestone fragments up to 3" thick, many	
					small fragments from gravel-size up to 3/8"	
					]    <b> </b>	_]
					]	J
]					]	]
]					]	
					]	
20					1	1
						$\neg$



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-04	SHEET	2	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS	: 1.0 ft b	gs on 3/23	3/07 5	START : 3/23/2007 END : 3/24/2007	LOGG	ER:	Α.	Teal, C. Sump
>				STANDARD PENETRATION	SOIL DESCRIPTION			 ပ	COMMENTS
N SINC	SAMPLE	INTERVA		TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR	>		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY O	)R	0	BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALO	JGY		SYM	INSTRUMENTATION
21.6				( )			┪	П	
		100	DO CN				1		
		10.0	R3-SN						
							]		
_							Ш		_
_							$\parallel$		_
-	-						$\parallel$		-
-							+		-
							+		-
25 <u> </u>							-		R3: 9 minutes
-	26.0						1		-
-	20.0				Silt With Sand And Limestone Fragments (ML)	.)	1		-
					26.0-36.0' - Same as 16.0-26.0' except strong Horeaction, limestone fragments up to 2", 20% very	v fine			
_					to fine sand-sized fragments, last 3" slightly dark color to light olive gray (5Y 5/2)	ker in			_
_					55.6. to light since gray (6 : 5/2)		4		_
-							$\parallel$		-
-							$\parallel$		-
-							+		-
30 <u> </u>							+		_
-	-						$\exists$		-
-	-	10.0	R4-SN				1		-
-							1		-
							]		
_									_
_							$\parallel$		_
-							$\parallel$		-
-							$\parallel$		-
35 6.6	-						$\dashv$		R4: 12 minutes —
-	36.0						+		-
-	30.0				Limestone		┰	H	·
-	-				36.0-44.7' - light olive gray, (5Y 5/2), fine to medi	lium strona	1	L	·
1 -	1				36.0-44.7' - light olive gray, (5Y 5/2), fine to med grained, strong HCl reaction, medium strong to s (R3 to R4), strongly cemented, 80-90% coverage small voids, few cavities up to 1/4" in size	e of	1		-
1 [					Sinaii voius, iew cavilies up lo 1/4 III Size		1	L	
-							F		
-							F		-
-	-						F		-
40							丰	_	



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	I-04	SHEET	3	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLING METHOD AND EQUIPMENT: Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel

ORIENTATION: Vertical

WATER	LEVELS	: 1.0 ft bo	as on 3/23	3/07 S	START : 3/23/2007 END : 3/24/2007 LOGGE	R : A	Teal, C. Sump
				STANDARD	SOIL DESCRIPTION	U	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME TIGOGO CHOTTE CAMBOL COLLOS	SYMBOLIC LOG	DEDTIL OF CACING SOUL INC DATE
H BE ACE ATIO		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	ğ	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
LEV			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYME	INSTRUMENTATION
1.6				(14)		Ű	
-						Ь	1
_		10.0	R5-SN			Ъ	
_						Ъ	-  1
						F	]
_						F	_
_						F	
-						Ħ	
						Ļ	-
45 -3.4					Sandy Lean Clay (CL) 44.7-46.0' - moderate olive brown, (5Y 4/4), moist, low	<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>	R5: 8 minutes
-	46.0				to moderate plasticity, strong HCl reaction, 30-40% sand-sized sand, carbonate materials	$\frac{1}{2}$	1
-	40.0				Silt (ML)	m	1
					46.0-47.6' - light olive gray, (5Y 5/2), nonplastic to low plasticity, moderate to strong HCl reaction, fine to		
					medium sand-sized particles, carbonate materials	]	
_					Limestone 47.6-55.5' - Same as 36.0-46.0' except many zones	Ħ	_
_					where rock fragments from fine to medium sand-sized	P	
-					up to cobble sized fragments, possibly from drilling	ै	
						╆	
50 -8.4					<del>-</del>	╁	1 ⊢
-						╆	1
-		9.5	R6-SN			┢	1 1
						Ъ	]
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_						占	_
-						占	
-						士	
-						$\mathbf{t}$	-
55 <u> </u>					<del>-</del>	Б	R6: 9 minutes
-					No Recovery 55.5-56.0'	F	7 1
					Begin Rock Coring at 56.0 ft bgs	T	
					See the next sheet for the rock core log	]	]
] -							
_						1	
-						-	
-						-	-
-						+	-
60						+	+



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-04	SHEET	4	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	ft bgs	on 3/	23/07 START : 3/23/2007 END : 3/	24/200	7 LOGGER : A. Teal, C. Sump	
≥∩≘	(%			DISCONTINUITIES	ဖွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - - - - - - - - - - - - - - - -	87-SN 10 ft 55%	NA R7-SN 10 ft NA		56.0-66.0' - NA		Limestone 56.0-57.4' - Same as 36.0-46.0' except silt to very fine to fine sand-sized fragments of limestone, possibly from drilling 57.4-58.7' - Same as 56.0-57.4'	Poor recovery due to core rods becoming stuck in hole. Driller asked if he could over drill with outer casing to recover bit in order to prevent future problems later that have come as a byproduct of overstressing these borings to "un-stick" steel.  NA = Not Applicable
	66.0		NR			No Recovery 61.5-66.0'	NR = No Recovery  R7: 43 minutes
    70 28.4	R8-SN 10 ft 76%	NA	NA	66.0-76.0' - NA		Limestone  66.0-76.0' - Same as 36.0-46.0' except strong HCl reaction, medium strong to strong (R3 to R4), 90-95% coverage small voids, many cavities up to 1/4", several silt zones in section	Silt zones explain poor recovery -
- - - 75 -33.4	76.0		NR			No Recovery 73.6-76.0'	R8: 21 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-04	SHEET	5	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 1.0	ft bg	s on 3/	23/07 START: 3/23/2007 END: 3/2	24/20	D7 LOGGER : A. Teal, C. Sump	
≥∩≘	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
ELO ON (f	N, AND RY (9		ZES IT	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
80 -38.4 -	R9-SN 10 ft 93%	NA	NA	76.0-86.0' - NA		Limestone 76.0-86.0' - Same as 36.0-46.0' except at 76.0-77.0' dark gray solution features, very fine micro-sized grains, many cavities up to 1/4" 77.0-86.0' - several silt zones, possibly due to drilling	The limestone matrix (olive gray limestone) has strong HCl reaction, while dark gray features have mild HCl reaction
85 -43.4	86.0		NR			-  - No Recovery 85.3-86.0'	R9: 26 minutes
90 -48.4 -	R10-SN 10 ft 100%		NA	86.0-96.0' - NA		Limestone  86.0-91.7' - Same as 36.0-46.0' except yellowish gray, (5Y 7/2), 60-70% coverage of small voids  Organic Clay (OH) 91.7-92.0' - greenish black, (5GY 2/1), very stiff, low plasticity, micro stress features (folding) bedding features	- - - - - - - - - - - - - - - - - - -
95 -53.4 _	96.0						R10: 15 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	I-04	SHEET	6	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 1.0	) ft bgs	s on 3/	23/07 START : 3/23/2007 END : 3/	24/200	7 LOGGER : A. Teal, C. Sump		
<b>≥</b> 0₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,	
TH B	E RU GTH, OVE	R Q D (%)	CTU	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BOL	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD	
DEP SUR ELE	COR	RQ	FRA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.	
					Ш	Limestone		
					Ш	- 96.0-106.0' - Same as 36.0-46.0'	-	
				96.0-106.0' - NA	固	-		
					Ы	_		
_			NA		Ы	-	_	
_					$\mathbb{H}$	-	_	
_					$\Box$	-	-	
100_ -58.4				_	H	_	_	
-	R11-SN				目	-	-	
-	10 ft 50%				Ħ	No Recovery 101.0-106.0'	-	
-	30 /6				Ħ	-	-	
-					H	-	-	
		NR	NR		H	-		
				ND	ND		Ш	_
			INIX		Н	_		
_					Н	_	_	
105_ -63.4				_	円			
-03.4					Н	-	R11: 27 minutes	
-	106.0				H	Disaggregated Weak Limestone	Logger changes to C.	
-					H	- 106.0-116.0' - very pale orange,	Sump at 106.0' until end of -	
-				106.0-116.0' - NA	団	(10YR 8/2), strong HCl reaction, gravel-sized clasts of more indurated	log _	
_					ш	<ul> <li>fine grained material, thin (&lt;1/32") calcite fracture coating observed on</li> </ul>	Driller's Remark: – maintaining drilling fluid	
_				•	団	one indurated fragment, fossil molds	circulation at 106.0-112.0'	
					Ш	<ul> <li>visible on few indurated fragments;</li> <li>115.5-116.0' - weak (R2), roughly</li> </ul>	Weak limestone	
					Ш	horizontal parting surfaces (2-3" apart), rough and undulating	completely disaggregated by drilling method -	
110_				_	Ш	—		
-68. <del>4</del>	D40 01				$oxed{\square}$	-	Run time: N/A, core at end of previous shift retrieved –	
-	R12-SN 10 ft		NA		$\prod$	-	at start of this shift (3/24/07)	
-	100%				$\Box$	-	-	
-					H	-	-	
-					H	-	-	
-					Ħ	-	-	
-					Ħ	-	-	
					Ш	-	-	
115					$\boxminus$	_	1	
-73.4					$\mathbb{H}$	-		
	116.0				囯			
							<u> </u>	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-04	SHEET	7	OF	14	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	ft bgs	s on 3/	23/07 START: 3/23/2007 END: 3	/24/200	COMPANY OF THE STREET OF THE S	
>	(9)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R13-SN 10 ft 85%		NA	116.0-126.0' - NA		Limestone Fragments  116.0-124.5' - very pale orange, (10YR 8/2), strong HCI reaction, fragments very weak and friable, range in size from fine gravel to 3.0" lenticular disc-shaped fragments (1-2" thickness), large fragments may be indicative of thin more competent limestone beds with weaker interbeds that disintegrate during drilling	Material lost from 124.5-126.0' may have been fines
125 -83.4 -	126.0		NR	-		No Recovery 124.5-126.0'	lost over length of run R13: 17 minutes
    130 -88.4  	R14-SN 10 ft 79%		NA	126.0-136.0' - NA		Disaggregated Limestone With Limestone Fragments 126.0-133.9" - very pale orange to yellowish gray, (10YR 8/2 to 5Y 7/2), very strong HCI reaction, >15% gravel-sized limestone fragments, limestone fragments 1" or less in silty zone increasing to 2.5" in the lower half of run, silt-size particles grading with depth into sand-sized fragments	- - - - - - - - - - - -
135 -93.4	136.0		NR	-		No Recovery 133.9-136.0'	R14: 20 minutes



PROJECT NUMBER:

338884.FL

BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

COMINC	WETTOD A	ND LC	ZOII IV	IENT: Rotosonic S/N SR-116, sonic, 6" outer casing and	4 66	ie bailei	ORIENTATION : Vertical
WATER	LEVELS : 1.0	ft bgs	s on 3/		24/20		•
>0≎	_ (G			DISCONTINUITIES	ρ̈	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - -				136.0-146.0' - NA		Disaggregated Limestone With Limestone Fragments 136.0-140.0' - very pale orange, (10YR 8/2), strong HCl reaction, gravel-sized (<1.0" diameter) fragments similar to 126.0-136.0, horizontal partings range from 0.75-3.0" with little to no fine grained infill material	- - - - -
140 -98.4 	R15-SN 10 ft I 87%		NA			Limestone And Limestone Fragments 140.0-142.5' - very pale orange, (10YR 8/2), strong HCI reaction, medium strong (R3), fossiliferous limestone with molds and casts, fine grained with irregular zones of small voids (<1/32-1/8") covering 25-30% of surface, large brachiopod molds and casts up to 0.75" diameter, surfaces of molds and casts have fine crystalline appearance indicating partial recrystallization, fine grain pyrite crystals on the interior of some molds; horizontal partings range from	
145_ -103.4 -	146.0		NR		Ė	0.75-30" with little or no fragment infill material <b>Limestone</b>	R15: 24 minutes  Driller's Remark: Lost
150 -108.4	R16-SN 10 ft 75%		NA	146.0-156.0' - NA		142.5-143.5' - medium yellow brown, (10YR 5/4), medium HCl reaction 143.5-144.7' - yellowish gray, (5Y 7/2), strong (R4), fine grained limestone with thin (1/64-1/32") pale yellowish brown laminations on variable spacing (1/32-1/8"), dense, partial recrystallization, moderate HCl reaction at grain boundaries and when scratched, possible very fine silica sand (<10%), 15-30" horizontal partings (bedding plane) with medium indurated light olive gray (5Y 5/2) interbeds 0.75-1.0" thick No Recovery 144.7-146.0' Limestone Fragments 146.0-147.8' - very strong HCl reaction, weak (R2), partially friable by hand, fragments 1-2" diameter and <1/2" thick (lenticular), likely representing thinly bedded material	circulation (driving 6" casing) at approximately 141'  Trace very fine silica sand grains (<5%)
- 155_ -113.4 -	156.0		NR			-  -	R16: 22 minutes



PROJECT NUMBER:

33884.FL BORING NUMBER:

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 1.0	) ft bgs	s on 3/	23/07 START: 3/23/2007 END: 3/	24/20	07 LOGGER : A. Teal, C. Sump	
>00	6)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A TIO	TH, /	D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	J G	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
LEV.	ORE	Ø	RAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ООШ	075	α.	шФ	THORACOC, COTA NOL CIVILIANO, PARE HOLLING	S	Limestone	
-				-	Ħ	<ul> <li>147.8-150.5' - pale yellowish brown,</li> </ul>	-
-				156.0-166.0' - NA	H	(10YR 6/2), strong HCl reaction, medium strong to strong (R3 to R4),	Driller's Remark: Sample
-				100.0-100.0 - NA	₽	<ul> <li>dense, poorly fossiliferous with few</li> </ul>	fell out of core barrel -
-				-	$\blacksquare$	small voids (1/32-1/8") on <5% of surface, light gray (N7) clayey silt	during retrieval. Used 20' core barrel to recover this
-				-	$\perp$	<ul> <li>interbed at 148.2' (2" thick) with thin</li> </ul>	interval plus following run -
-				-	世	coatings on partings below, slight recrystallization evident on fresh	(166.0-176.0'). Sample is disturbed, upward fining
-				-	$\pm$	<ul> <li>surfaces</li> <li>150.5-151.5' - moderate yellowish</li> </ul>	sequence from 156.0-
160_ -118.4				_	╁	brown, (10YR 5/4), mild to moderate	161.0' may be the result of losing the sample on first
-	R17-SN		NA	-	F	<ul> <li>HCI reaction, friable thinly bedded (&lt;1/2") limestone fragments with</li> </ul>	attempt. –
-	10 ft 87%			-	片	sandy fines, trace silica sand grains	-
-	0170			-	片	_ (<5%) 151.5-153.5' - Same as 150.5-151.5'	Up to 10% silica sand
-				-	╁	<ul> <li>except moderate yellowish brown,</li> </ul>	grains
-				-	$\vdash$	sandy silt at bottom  No Recovery 153.5-156.0'	With up to 10% fine silica
-				-	仜	<ul> <li>Disaggregated Limestone With</li> </ul>	sand grains -
-				-	工	Limestone Fragments 156.0-161.6' - with few subangular to	-
-				-	ш	subrounded limestone fragments at top of run grading with depth to	-
165				-	$\perp$	Poorly Graded Gravel with Sand	-
-123.4			NR	_	$\vdash$	(GP), sand-sized and gravel-sized fragments are all carbonate derived	_
_	166.0			-	H	and likely segregated during drilling	_
				-	Ħ	- 161.6-161.8' - moderate yellow brown, (10YR 5/4), strong HCl	166.0-176.0' interval not
				_		reaction	disturbed -
				166.0-176.0' - NA		<ul> <li>Limestone</li> <li>161.8-164.7' - moderate yellow</li> </ul>	
					$\vdash$	brown to dark yellowish brown, - (10YR 5/4 to 10YR 4/2), moderate to	
				_	$\Box$	strong particularly at grain	_
l _				_	Ш	boundaries HCl reaction, - argillaceous, horizontal partings, 1-6"	_
_					Т	spacing with light gray sandy silt	_
170				_		interbeds/coating (light gray, N7)  No Recovery 164.7-166.0'	_
-128 <u>.4</u> -	D40 01		NA	-	$\vdash$	Limestone 166.0-168.5' - light olive gray, (5Y	-
-	R18-SN 10 ft			<u>-</u>	$\vdash$	<ul> <li>5/2), moderate especially grain</li> </ul>	-
-	89%			-	F	boundaries HCl reaction, poorly to moderately indurated argillaceous	-
-				-	片	<ul> <li>fine grained limestone, finely</li> </ul>	-
-				-	世	laminated, with very thin (1/16-1/8") very pale orange (10YR 8/2)	-
-				-	世	<ul> <li>laminations, 1/8"-3/8" spacing, more indurated zones exhibit well</li> </ul>	-
-				-	H	developed bedding plane partings,	-
-				-	F	<ul> <li>less indurated zones are soft and friable and exhibit contorted</li> </ul>	-
175				-	仜	lamination surfaces, pale orange	-
175_ -133.4				_	仜	greater than olive gray	
-	176.0		NR	-	士	-	-
	170.0				1		



PROJECT NUMBER:	BORING NUMBER:					•
338884 FI	I-04	CHEET	10	ΩE	11	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	ft bgs	on 3/	23/07 START: 3/23/2007 END:	3/24/200	D7 LOGGER: A. Teal, C. Sump	
≥∩≎	(9)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 180 - 138.4 - - - -	R19-SN 10 ft 84%		NA	176.0-186.0' - NA		Limestone  168.5-171.0' - yellowish gray, (5Y 7/2), medium strong (R3), poorly fossiliferous with small voids  (1/16-1/8") over <10% of surface, horizontal partings 1-4" spacing, light gray (N7) clayey silt with gravel-sized limestone fragments  Limestone Fragments  171.0-174.9' - Same as 168.5-171.0' except with more fragmentation and disaggregation (down to silt and clay-sized particles) possibly due to drilling, full core-sized limestone fragment at end of run  No Recovery 174.9-176.0' Limestone Fragments 176.0-178.6' - moderate yellow brown, (10YR 8/9), fine grained, argillaceous, with fine gravel-sized small fragments, fragments exhibit well defined bedding plane fractures (1/4" bedding) Disaggregated Limestone With Limestone Fragments 178.6-178.9' - moderate yellow	10% silica fine sand
185 -143.4 -	186.0		NR			brown, (10YR 8/9), medium to coarse grained, moderate HCl reaction Limestone	R19: 33 minutes
	R20-SN 10 ft 93%		NA	186.0-196.0' - NA		178.9-182.0' - grayish orange, (10YR 7/4), 20-30% small voids (1/16-1/8") in discreet zones, few larger solution cavities (possible fossil molds) 1"x1"  Disaggregated Limestone With Limestone Fragments  182.0-183.5' - Same as 178.9-182.0 except moderate yellow brown, (10YR 8/9), 4" layer argillaceous, limestone fragments are gravel-sized Limestone  183.5-184.4' - Same as 178.9-182.0' except increasing fossil content with depth, large (up to 1.0") brachiopod and gastropod molds and casts  No Recovery 184.4-186.0'	R20: 23 minutes
-	4000		NR			_	1120. 20 Hilliu(63
-	196.0				++		-



PROJECT NUMBER:	BORING NUMBER:				
338884 FI	I_04	SHEET	11	ΩE	1/

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		<i>(</i> 0	DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
DEPTH BELO' SURFACE AN ELEVATION (#	CUN, H, ANE ERY (6		<b>.</b> 0		1 🛚 1		COMMENTO
	CORE F LENGTH RECOVI	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
200 -158.4 - - - - - - - 205 -163.4	R21-SN 10 ft 92%		NA	196.0-206.0' - NA		Limestone And Limestone  Fragments  186.0-195.3' - grayish orange, (10YR 7/9), limestone with variable percentage of small voids (1/16-1/8"), larger cavities and fossil molds up to 1.0" in diameter (few), length of full core diameter limestone fragments range from 1-2" with few fragments range from 1-2" with few fragments void; parting surfaces are rough and irregular, zones of smaller fragments contain fine grained limestone with little or no fossils/small voids, smaller fragments tend to be more angular and exhibit well define bedding planes approximately 1/2"-3/4" thick, sand-sized and gravel-sized limestone fragments at end of run 193.8-195.3'  No Recovery 195.3-196.0' Limestone Fragments 196.0-199.0' - fine grained, mild to moderate HCI reaction, medium strong (R3), 90% fragments are >1" diameter, angular and lack well developed bedding plane surfaces (rough, irregular fracture surfaces), tends to be more equidimensional	R21: 22 minutes
210 -168.4 - - - - - - 215 -173.4	R22-SN 10 ft 100%		NA NA	206.0-216.0' - NA	tends to be more equidimensional than fine grained limestone fragments noted earlier, trace silt-sized particles  199.0-201.0' - well graded upward fining sequence of fine grained limestone fragments beginning with coarse sand-sized and ending with fragments >1" similar to above 201.0-204.2' - fragments are gravel-sized, and are less angular, contain small voids (1/16"-1/8") over 10-20% of surface, and are more fossiliferous than fragments above  Disaggregated Limestone 204.2-205.2' - moderate yellow brown, (10YR 7/4), strong HCl reaction, "punky texture", weakly indurated, somewhat mottled/remnant laminations  No Recovery 205.2-206.0'  Disaggregated Limestone With Limestone Fragments 206.0-216.0' - moderate HCl reaction, all material carbonate derived, limestone fragments are gravel-sized, large (>3.0") limestone fragments at 208.2-209.3', 6" slightly indurated silt bed at 212.0', finely laminated more indurated layers in center of bed (<3/4" thick)		



PROJECT NUMBER:	BORING NUMBER:		
338884.FI	l I-04	SHEET	12 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WAIER	LEVELS : 1.0	ft bgs	s on 3/	23/07 START: 3/23/2007 END: 3/3	24/200	7 LOGGER : A. Teal, C. Sump	
≥0.00	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
220 -178.4 - - - - - - - - - - - - - - - - - - -	R23-SN 10 ft 1 94%		NA	216.0-226.0' - NA		Disaggregated Limestone With Limestone Fragments 216.0-226.0' - mild HCI reaction, grading to Silty Sand with Gravel (SP-SM) in places, similar to above (206.0-216.0') except greater silt and sand-sized particles and limestone fragments are smaller (<1") and weaker (very friable)  216.6-217.0' moderately indurated silt-sized, light gray (N7) bed, friable	R23: 24 minutes
-105.4			NR	-		No Recovery 225.4-226.0'	R25. 24 IIIIIIules
230188.4	R24-SN 10 ft 100%		NA	226.0-236.0' - NA		Disaggregated Limestone With Limestone Fragments 226.0-236.0' - Same as 216.0-226.0' except no semi indurated silt bed, slight increase in overall fine to medium sand-sized material (carbonate derived), few zones with very thin (<3/4") gravel-sized angular fragments of limestone (or indurated calcareous silt-sized material)	- - - - - - - - - - - - - - - - - - -
-193.4	236.0					<del>-</del> -	R24: 36 minutes



PROJECT NUMBER:	BORING NUMBER:			
338884 FI	I-04	CHEET	13 OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

	-			IENT: Rotosonic S/N SR-116, sonic, 6" outer casing and		10 54.101	ORIENTATION: Vertical
WATER	LEVELS: 1.0	ft bgs	s on 3/		24/200	D7 LOGGER : A. Teal, C. Sump	
200	(5)			DISCONTINUITIES	υ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
240 -198.4 - - - - - - - - - - - - - - - - - - -	R25-SN 10 ft 100%		NA	236.0-246.0' - NA		Disaggregated Limestone With Limestone Fragments 236.0-246.0' - Same as 226.0-236.0' except weakly consolidated silt-sized material with little gravel-sized limestone fragments from 236.0-237.5', otherwise very similar to above	R25: 27 minutes
250 -208.4 - - - - - - - - - 255 - 213.4	246.0 R26-SN 10 ft 100%		NA	246.0-256.0' - NA		246.0-256.0' - mild to moderate HCI reaction, slightly more indurated silt-sized material forming larger clasts, finely laminated very weakly indurated 6" thick silt zones at 248.5, 249.2', 251.8' and 254.0' (repeating sequence), may be argillaceous	R26: 31 minutes



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l-04	SHEET	14	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723902.3 N, 457585.6 E (NAD83)

ELEVATION: 41.6 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

00.1	JWETHOD 7		ZOII IV	IENT: Rotosonic S/N SR-116, sonic, 6" outer casing and	7 00	OIC L	Dairei	ORIENTATION : Vertical
WATER	LEVELS: 1.0	) ft bas	s on 3/	/23/07 START: 3/23/2007 END: 3/	24/20	007	LOGGER: A. Teal, C. Sump	
				DISCONTINUITIES			LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)				SYMBOLIC LOG	$\vdash$		33E(110
NA N	ΣΑΣ	_	₹	DESCRIPTION	CL		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
	S F, A	R Q D (%)	28	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	딩		MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
₽₽₩	#58 858	ΩZ	AC.	PLANARITY, INFILLING MATERIAL AND	MB		AND ROCK MASS	SMOOTHNESS, CAVING ROD
吕S급	응필版	RO	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SΥ		CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
					$\vdash$	t	Disaggregated Limestone With	No silica sand grains
-						┢	Limestone Fragments	visible (too fine grained) -
l _					$\vdash$	1	256.0-266.0' - Same as 246.0-256.0'	
				256.0-266.0' - NA	Н		except lack of distinct laminated beds	
-					匚	1	of silt-sized material, silty sand-sized,	-
-					₽		with gravel-sized limestone fragments (weak, friable), all	-
l _					H	L	carbonate derived	_
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265 -223.4				_	H	┢		R27: 37 minutes
-225.4						1		R27. 37 Hilliutes
	266.0				Н	1		
-					Г	Г	Bottom of Boring at 266.0 ft bgs on	
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PROJECT NUMBER: BORING NUMBER: 338884.FL I-05 SHEET 1 OF 14

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLIN	G METH	OD AND	EQUIPM	ENT : Rotosonic S	S/N SR-116, sonic, 6" outer casing and 4" core barrel		ORIENTATION : Vertical
WATER	LEVELS	: 4.41 bg	s on 3/6/0	)7 5	TART : 2/9/2007 END : 2/12/2007 LOGGER :	М.	Faurote, J. Burkard
> ~ ~				STANDARD	SOIL DESCRIPTION	ရွ	COMMENTS
A ANE	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME TIGOS OBOTILD OVANDOL GOLOD	SLOG	DEDTIL OF GACING DRILLING DATE
H H H H H		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC	INSTRUMENTATION
<u> </u>	0.0			(N)	Poorly Graded Sand (SP)	S	"Water level is based on Ground Water
	0.0	6.0	R1-SN		0.0-5.0' - brownish gray, (5YR 4/1), moist, very fine grained, no HCl reaction, angular to subrounded, weakly to moderately iron oxide stained, black organic blebs, limited bedding, silica sand 1.0-1.5' - brownish black to moderate brown, (5YR 2/1 to 5YR 3/4) 1.5-5.0' - light brown to dark yellowish orange, (5YR 5/6 to 10YR 6/6)		Water levels based of Glound Water Monitoring at LNP site (FSAR Table 2.4.12.08)"  Water levels were not recorded for I-05  Coring run times were not recorded for I-05
37.2 - -	6.0				Well Graded Sand With Silt And Limestone Fragments (SW-SM) 5.0-6.0' - pale green, (10G 6/2), no to mild HCl	0	Drilled extremely fast, sands are loose and friable with enough silt to be cohesive
10 32.2 - 12 - 15 27.2 - - - - - - - - - - - - - - - - - - -	16.0	10.0	R2-SN		hard, with shell fragments)  Poorly Graded Sand With Silt (SP-SM) 6.0-7.3' - dark yellowish orange, (10YR 6/6), very fine grained, no to mild HCl reaction, 12-15% nonplastic fines, iron oxide staining, silica sand  Clayey Sand (SC) 7.3-8.1' - dark yellowish orange to light brown, (10YR 6/6 to 5YR 5/6), very fine to fine grained, no HCl reaction, 15% medium plastic fines, silica sand, iron stained  Sandy Silt (ML) 8.1-13.0' - grayish orange, (10YR 7/4), loose, nonplastic, no dilatancy, mild HCl reaction, with very fine to fine grained sand-sized particles, carbonate materials  Sandy Silt And Limestone Fragments (ML) 13.0-19.0' - grayish orange, (10YR 7/4), low plasticity, mild to moderate HCl reaction, with fine to coarse sand-sized particles and rock fragments (1/4" to 1/2", friable, fossiliferous, no HCl reaction), all carbonate material  Silt (ML) 19.0-20.0' - grayish orange, (10YR 7/4), low plasticity, mild to moderate HCl reaction, carbonate material		These fine grained materials may be the friable limestone destroyed via sonic drilling methods



PROJECT NUMBER:

338884.FL

BORING NUMBER:

I-05 SHEET 2 OF 14

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLING METHOD AND EQUIPMENT: Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel

ORIENTATION: Vertical

DRILLIN	G METH	OD AND	EQUIPM	ENT : Rotosonic S	S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION: Vertical
WATER	LEVELS	: 4.41 bg	s on 3/6/0	)7 S	START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	AL (ft)	PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
O HE A		RECOVE		TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, 모 DEPTH OF CASING, DRILLING RATE,
A H S H		RECOVE	=ΚΥ (π)		MOISTURE CONTENT, RELATIVE DENSITY OR OF DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
22.2				(N)	
					Silty Sand With Limestone Fragments (SM) 20.0-21.3' - dusky yellow, (5Y 6/4), limestone
l _		10.0	R3-SN		fragments are friable, 1/4" to 2" in size, fossiliferous
		10.0	113-314		(casts/molds), some shell "hash", all carbonate
-					\material   Sandy Silt (ML)
-					21.3-24.8' - dusky yellow, (5Y 6/4), nonplastic to low
-					plasticity, mild to moderate HCl reaction, carbonate -
-					material
l _					<b>I</b>
					1
25					
25 17.2					Silty Sand With Limestone Fragments (SM) — Forams, gastropods, possible bryozoans —
-					24.8-31.2' - grayish orange, (10YR 7/4), fine to coarse grained, moderate HCl reaction, with nonplastic to low
-	26.0				plasticity fines and fine to coarse gravel-sized (1/4 to 🔠 📗 📗
I _					1/2") limestone (fossiliferous [molds/casts], friable), all □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □
					carbonate materials, iron oxide staining at 27.0'
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-		10.0	R4-SN		<u> </u>
-					Limestone Interfragmental filling of fat clay, clay and
_					31.2-34.0' - greenish gray, (5GY 6/1), very fine to fine grained, mild HCl reaction, fragmented (up to 2" size), gravel-sized fragments; the fines have
					fragments separated by fat clay with sand (pale graver-sized fragments reaction to HCl, limited plasticity
					yellowish brown [10YR 6/2]), limestone fragments
-					have abundant fossil casts, sparse organic fragments
-					and cast linings, HCl reaction occurs mostly at void linings and healed fractures
-					Silt With Sand (ML)
-					34.0-36.0' - pale yellowish brown, (10YR 6/2),
35					nonplastic, moderate HCl reaction, with very fine
7.2					grained sand-size particles, all carbonate materials
	36.0				1
I -	30.0				Fat Clay With Sand (CH)  Silica grains (very fine) to silt-sized in very
-					36.0-37.6' - grayish brown, (5YR 3/2), high plasticity, — thin pseudobeds may exhibit microstructures
-					no HCl reaction, with very fine to fine grained silica of deformation and bedding sand, organic rich
-					<u></u>
					Silty Sand To Sandy Silt (SM)
I -					37.6-47.8' - pale yellowish brown, (10YR 6/2), trace fine gravel-sized fragments of fossiliferous limestone,
-					with grayish brown (5YR 3/2) stringers of clay
-					(medium plastic, trace sand-sized grains) at
-					46.7-47.5', all carbonate materials
40					<u> </u>
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-05	SHFFT	3	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

			s on 3/6/0		END : 2/12/200		OGGED	· M	Faurote, J. Burkard	
	LL V LLO	. <del></del> 1 DQ	5 511 5/0/0		START : 2/9/2007	SOIL DESCRIPTION		JOOLA		COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	STANDARD PENETRATION TEST RESULTS					SYMBOLIC LOG	
BEL CE A		RECOVE	ERY (ft)	TEST RESOLTS	SOIL NAIN	ME, USCS GROUP SYMI E CONTENT, RELATIVE	BOL, COLOR,	CLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
PTH			#TYPE	6"-6"-6"	CONSISTEN	NCY, SOIL STRUCTURE	, MINERALOG	Ϋ́	MB	INSTRUMENTATION
				(N)					σ ππ	
2.2								_		-
-		10.0	R5-SN					-		-
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-								1		-
45										_
-2.8										
_	46.0				_					_
_								_		_
-								_		Grayish brown clay (5YR 3/2) as stringers,
_								_		tacky, soft and contains minor sand size grains
-					Sandy Silt Wi	th Limestone Fragme	nts (ML)		Ħ	-
_					nonplastic, mo	ale yellowish brown, (5' oderate HCl reaction, w	ith very fine to	:o -		-
-					fine sand-size	d particles and 20-35% mestone fragments, pe	fine to coars	se -		-
					limestone frag	ments increases with	depth, all	-		-
50 <u> </u>					carbonate ma	terials		_		Brown clay seams
-								-		-
-		10.0	R6-SN					1		-
										Clay seams
										Gravel-sized fragments increase in percentage to end of run
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'-"-								-		-
1 -					Begin Rock C	oring at 56.0 ft bgs			Ш	
-					See the next s	sheet for the rock core	log	-		-
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PROJECT NUMBER:

338884.FL

BORING NUMBER:

I-05 SHEET 4 OF 14

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	5/07 START : 2/9/2007 END : 2/	12/200	D7 LOGGER : M. Faurote, J. Burkard	
≥∩ ≘	_			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R7-SN 10 ft 100%	NA	NA	56.0-66.0' - NA		Limestone Fragments  56.0-57.5' - pale yellowish brown, (10YR 6/2), fine to medium grained, moderate HCl reaction, fragments from 1/2" to 1" in length, fossil casts and tiny voids over 100% of the surface  Disaggregated Limestone With Limestone Fragments 57.5-62.5' - dusky yellow, (5Y 6/4), moderate HCl reaction, sparse limestone fragments to 4"  Limestone 62.5-66.0' - pale yellowish brown, (10YR 6/2), fine to medium grained, moderate HCl reaction, medium strong (R3), limestone fragments from 1/2" to 8" with fossil casts and small (<1/16" voids over 100%  surface, interbedded with clay	Rock may have been fragmented due to the drilling process  Limestone fragments 58.5-59.3', 61.7-62.0'  NA = Not Applicable NR = No Recovery
70 -27.8 - - - - - - - - - - - - - - - - - - -	R8-SN 10 ft 100%	NA	NA	66.0-76.0' - NA		66.0-70.0' - moderate olive brown, (5Y 4/4), fine grained, strong HCI reaction, medium strong to strong (R3 to R4), fragmented, with fragments from 4" to 6", fossiliferous with voids (<1/16") covering 85% of surface, intermittent sections of clay, silt, gravelly silt, and silty clay comprising 10% of core  Disaggregated Weak Limestone 70.0-71.0' - light brown, (5YR 6/4), moderate to strong HCI reaction, all carbonate derived 71.0-71.8' - light medium brown to grayish orange, (10YR 7/4) Limestone 71.8-76.5' - Same as 66.0-70.0' except light brown, (5YR 6/4), weak to medium strong (R2 to R3), fragments to 3" in length, 15% fine sand-sized particles, sparse organic material	SC-1 collected at 69.3-70.0'  Possible organics in 1/4" or less stringers



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	I-05	SHEET	5	OF	14	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	S/07 START : 2/9/2007 END : 2/	12/20	D7 LOGGER : M. Faurote, J. Burkan	d
≩Q⊋	(%			DISCONTINUITIES	၅၉	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-				76.0-86.0' - NA		Disaggregated Limestone With Limestone Fragments 76.5-79.5' - light brown, (5YR 5/6), strong HCl reaction, gravel-sized (3/8" to 1") limestone fragments	Limestone fragments are very friable, easily broken with finger pressure, very fossiliferous and composed of sand and silt sized carbonate derived grains
80	R9-SN 10 ft 90%	NA	NA		Limestone  79.5-85.0' - moderate yellowish brown, (10YR 5/4), moderate HCI reaction, medium strong to strong (R3 to R4), fragments up up 4" in length, infilling between fragments or partings, partings range from 1/2" to 2" wide, 60-70% porosity on fresh surface, delayed reaction to HCI	- - - - - -	
-42.8	86.0		NR	- -		- - - - No Recovery 85.0-86.0'	
90 -47.8 -	R10-SN 10 ft 90%		NA	86.0-96.0' - NA		Limestone  86.0-87.0' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, pulverized to sand-sized particles Limestone Fragments  87.0-88.0' - light brown, (5YR 5/6), fragments are in a sandy silt matrix, probably separated from material 86.0-87.0'  Disaggregated Limestone With Limestone Fragments  88.0-89.8' - yellowish gray, (5Y 7/2), strong HCl reaction, carbonate derived, subrounded limestone fragments up to 1-1/2", with moderate HCl reaction  Disaggregated Limestone  89.8-92.5' - yellowish gray, thinly bedded (<3/8") down to varve-like planes  Limestone  92.5-93.4' - very pale orange, (10YR 8/2), micritic, sparse flecks of organic material	Limestone contains numerous voids (65-70%) of fossil casts and molds, thin (<1/8") organic stringers less than 1/2" long
95 <u> </u>	96.0		NR			<del>-</del> -	-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-05	SHEET	6	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER LEVELS: 4.41 bgs on 3/6/07				5/07 START : 2/9/2007 END : 2/	12/200	<ul><li>7 LOGGER : M. Faurote, J. Burkard</li></ul>	i
>00	6)			DISCONTINUITIES	Ŋ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R11-SN 10 ft 100%		NA	96.0-106.0' - NA		Disaggregated Limestone With Limestone Fragments 93.4-95.0' - very pale orange fines, (10YR 5/2), strong HCl reaction, grayish orange pink (5YR 7/2) limestone fragments from 3/16" to >2", fragments are fossiliferous with casts and molds, <5% shell fragments, <10% organic material, fragments react moderately to HCl No Recovery 95.0-96.0' Disaggregated Limestone With Limestone Fragments 96.0-115.5' - very pale orange, (10YR 8/2), moderate to strong HCl reaction, grades from a tacky, pasty, carbonate derived silt/clay with 10-15% sand-sized particles becoming 35-45% gravel-sized fragments at 102.3', fragments are fossiliferous limestone (bi-valves, forams and bryozoans) with 50% void space, no organic material	
-110 -67.8 - - - - - - - - - - - - - - - - - - -	R12-SN 10 ft 95%		NA NR	106.0-116.0' - NA		Very friable light brown (5YR 6/4) limestone fragments of carbonate derived sand and silt at 110.5', fragments from 2"x2-1/2" to pea gravel size with numerous fossil casts and visible shell fragments, most of the rock is sand and silt-sized grains, void space is minimal at 25-30%, moderate HCI reaction  No Recovery 115.5-116.0'	Loose carbonate grains ar the same as the constituents of the limestone fragments, suggesting that the drilling method disaggregates the limestone
	. 10.0				$\Box$		
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PROJECT NUMBER:	BORING NUMBER:					
338884.FI	I-05	SHEET	7	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 4.4	I1 bgs	on 3/6	6/07 START : 2/9/2007 END : 2/	12/20	D7 LOGGER : M. Faurote, J. Burkan	d			
>00	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS			
ANE (#	AAND ≪AND		ES	DESCRIPTION		ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
	855	ď	뜐핊	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	B.(6) 6, 1201 (12002) 6, 210.			
_				-	H	Disaggregated Limestone With  Limestone Fragments	_			
_				- 116.0-126.0' - NA	쓴	116.0-118.3' - very fine grained, 6" of light brown sandy silt-sized particles	Delayed mild to moderate			
-				110.0-120.0 - NA	H	<ul> <li>with gravel-sized particles atop 0.8'</li> </ul>	reaction to HCl on actual -			
-				-	Н	of limestone fragments, pale yellowish brown (micritic) limestone	limestone, finer grained _ clast fillings react strongly			
-				-	₩	<ul> <li>clasts with 15% void space and poorly fossiliferous</li> </ul>	to HCl - This is carbonate silt-sized			
_				-	₽	Disaggregated Limestone	material			
120				_	Н	<ul> <li>118.3-123.1' - very pale orange to grayish orange, (10YR 8/2 to 10YR</li> </ul>	_			
-77.8					H	7/4), strong HCl reaction, strong reaction to HCl in all carbonate	_			
-	R13-SN 10 ft		NA		F	derived particles, gravel-sized fragments at 120.5-121.0'	-			
_	100%			-	H	-	_			
_				-	H	-	-			
-				-	F	-	-			
-				-	田	_ Disaggregated Limestone With	-			
_				126.0-136.0' - NA	ш	Limestone Fragments 123.1-125.2' - very pale orange, (10YR 8/2), strong HCl reaction,	-			
125_					limestone fragments up to 1" in size					
-82.8					I	125.2-126.0' - very pale orange,				
-	126.0				拝	(10YR 8/2), 15% fragments (up to 3/4") of very fine grained limestone	The sequence at 126.0-			
-					扛	126.0-128.1' - very pale orange, (10YR 8/2), moderate HCl reaction,	136.0' looks very similar to the immediately preceding			
-					口	Licensian dilleging and any bands are inc.	fining upward materials			
_					L	of sand and silt-sized grains and	-			
					ш	3-5% black spots (1/16") that appear organic     Disaggregated Interbedded Weak     Limestone	The major part of these			
-					厂		runs were sliced in half by the spatula and moved with			
-					口	128.1-135.6' - grayish orange pink, (5YR 7/2), moderate to strong HCl	a mortar trowel; the gravelly parts tend to be in			
130_ -87.8								_	厂	— reaction, friable to micritic thin (<1/2")
-	R14-SN			-	口	limestone beds; beds are undulant and generally discontinuous across	-			
-	10 ft 100%		NA	-	口	- the width of the core	-			
-	.5570			-	口	-	-			
	-				口	- L				
-				_	口	- -				
-				-	口	-	-			
-				-	口	_	-			
105				-	仜	-	-			
135 <u> </u>				_	世	<u> </u>	_			
-	136.0			·	口	-	-			
L										



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-05	SHEET	8	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 4.4	11 <u>bg</u> s	on 3/6	6/07 START : 2/9/2007 END : 2/1	2/20	D7 LOGGER : M. Faurote, J. Burkard	<u></u>
>00	6)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R15-SN 10 ft 90%		NA	136.0-146.0' - NA		Limestone Fragments  135.6-137.5' - pale yellowish brown, (10YR 6/2), fine grained, mild HCI reaction, strong to very strong (R4 to R5), partings show thin re-crystallized coatings of carbonate and minor iron oxide  Disaggregated Weak Limestone With Limestone Fragments 137.5-141.0' - light brown, (5YR 6/4), fine grained, mild HCI reaction, fragments are angular, with apparent carbonaceous material on fracture surfaces and 5-15% of "spots" in fine grained limestone Limestone Fragments 141.0-142.5' - grayish orange, (10YR 7/4), very fine grained, mild HCI reaction, fragments up to 4" long, many partings with not much infilling, some iron oxides noted, particularly at 142.0-142.5' Limestone 142.5-145.0' - angular, granulated fragments, fragments are very friable and composed of silt and sand-sized carbonate particles No Recovery 145.0-146.0'	Large fossil (possible gastropod) in pale yellowish brown (10YR 6/2) limestone  This unit appears to be weak rock; limestone destroyed during sonic drilling  Limestone fragments appear broken due to drilling methods
-	146.0		NR	- -		Limestone	-
- - -						- 146.0-148.6' - the first 0.8' is angular to very angular washed limestone fragments up to 2-1/2", most fragments are porous (55% voids space) from fossil dissolution	- - - -
- 150 -107.8 -	R16-SN			- - - -		Disaggregated Weak Limestone  148.6-151.0' - yellowish gray, (5Y  7/2), strong HCl reaction, all size ranges are carbonate derived grains	- - - -
-	10 ft 100%	NA	NA	- - - -		Limestone 151.0-151.3' - light brown, (5YR 6/4), fossiliferous (casts), fragments up to 1" in size Disaggregated Limestone With Limestone Fragments 151.3-156.5' - strong HCl reaction, limestone fragments (5-20%) are	- - - -
- 155_ -112.8 -	156.0			- - -		yellowish gray (5Y 8/1), very fine to fine grained, friable, "orange" spots may indicate iron oxide halos, no discernible bedding features, at 155.6-156.0' the limestone fragments are up to 1-1/2", angular, and friable	- - -



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	I-05	SHEET	9 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DISCONTINUITIES  DESCRIPTION	FOG	LITHOLOGY  ROCK TYPE, COLOR,	COMMENTS
DEPTH BELO' SURFACE AN ELEVATION (f	CORE RUN, LENGTH, AND RECOVERY (	R Q D (%)	TURES	DESCRIPTION	2	BUCK TABE CULUB	
-			FRAC PER F	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R17-SN 10 ft 100%	NA	NA	- 156.0-166.0' - NA		Arenaceous Limestone  156.5-161.0' - pale brown, (5YR 5/2), very fine grained, medium strong (R3), fossiliferous, fragmented with the largest fragment being 0.4' long, 60% void spaces (casts of dissolved biota), sparse 1/16"-3/16" voids, thin to laminar bedding with beds as thin as 1/8", possible pyrite blebs  Limestone  161.0-162.3' - light brown, (5YR 6/4), very fine grained, moderate to strong HCI reaction, weak to medium strong (R2 to R3), fossiliferous (casts)  Limestone  162.3-163.8' - light brown, (5YR 6/4), mild HCI reaction, very thinly to thinly bedded, limestone contains silica grains  Disaggregated Weak Limestone  163.8-165.2' - light blive gray, (5Y 5/2), carbonate derived silt-sized particles along bedding planes <1/8"	159.0-161.0' may have been broken apart by the drilling method  This material is highly broken
170 -127.8 - - - - - - - - - - - - - - - - - - -	R18-SN 10 ft 90%	NA	NA NR	166.0-176.0' - NA		to 3/8" thick, beds contain shall strict to 3/8" thick, beds contain <10%  silica sand  Arenaceous Limestone  165.2-170.8' - light brown, (5YR 6/4), mild HCl reaction, medium strong (R3), 15-25% very fine silica grains widely distributed through the micro to very fine grained limestone, mild reaction to HCl, with a weak intergranular and void filling response, 40-45% porosity, arenaceous limestone grades into very fine grained limestone that is represented as 0.1' to 0.4' pieces to the end of this run (170.8')  Disaggregated Weak Limestone  170.8-171.6' - moderate brown, (5YR 4/4), moderate HCl reaction, <2% muscovite and pyrite as slightly oxidized blebs, some small rock fragments  Limestone  171.6-175.0' - pale brown, (5YR 5/2), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), thinly interbedded, porosity is 35-45%, mostly fossil casts  No Recovery 175.0-176.0'	The drilling method may have created the partings and vibrated the fines between individual pieces of rock  No euhedral or subhedral crystals visible SC-2 collected at 171.6- 172.3'



PROJECT NUMBER:

33884.FL

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

<u>WATE</u> R	LEVELS : 4.4	l1 bgs	on 3/6	6/07 START : 2/9/2007 END : 2/-	12/200	D7 LOGGER : M. Faurote, J. Burkard	d
> O ::	(9)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
N (ft	N, AND ₹Y (%		ES T	DESCRIPTION	C LO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
_				-	$oxed{\Box}$	Limestone - 176.0-183.2' - grayish orange to pale	Partings or interbed surfaces exhibit organic or
_				176.0-186.0' - NA	Н	brown, (10YR 7/4 to 5YR 5/2), very fine grained, mild to moderate HCl	iron oxide (Gothite) patinas _ or stains
-				- 170.0-100.0 - NA	Ш	<ul> <li>reaction, arenaceous, thinly</li> </ul>	-
-				-		interbedded with carbonate intergranular filling, HCl reaction is	-
_				-	Ш	<ul> <li>mainly in void filling and fossil cast lining, poorly fossiliferous, overt</li> </ul>	-
					Ш	porosity is <35%, limestone contact is irregular and gradational in a very	179.0-179.6' - Appears as a breccia, gray clast in pale
180					Н	thin zone (<1/16")	brown limestone matrix
-137 <u>.</u> 8	D40 ON		NA	-	Ш	_	-
-	R19-SN 10 ft			-	H	-	_ 181.0-182.1' - Thinly
-	90%			-	Ш	-	bedded limestone -
-				-	Ш	-	- 182.1-183.2' - Thin broken
					Ш	_	beds, drilling related
				_	H	Disaggregated Weak Limestone	183.2-185.0' - Unit may
_				-	H	183.2-185.0' - grayish orange, (10YR - 7/4), very fine grained, strong HCl	have been broken by drilling method, particularly
-				-	H	reaction, carbonate derived silt-sized and very fine sand-sized grains in	in "harder" beds
185 <u>-</u> -142.8				<del>-</del>	Ħ	irregular thin beds with organic     material defining some of the planar	_
-	186.0		NR	-	Ħ	features, silica <5% and sparse	-
					Ħ	<ul> <li>No Recovery 185.0-186.0'</li> <li>Disaggregated Limestone With</li> </ul>	This appears to be partially to be a very weak
_				400 0 400 0  NA	Ħ	Limestone Fragments  - 186.0-194.1' - grayish orange, (10YR	agglomeration of silt, sand
_				186.0-196.0' - NA -	Ħ	7/4), mild to moderate HCl reaction, up to 40% gravel-sized limestone	and rock (gravel-sized fragments) that may
-				-	Ħ	<ul> <li>fragments, broken and granulated, fragments range from &lt;1/4" to</li> </ul>	represent a collapse feature
_				-	Н	1-1/2"x2"x1", independent clasts	-
						<ul> <li>exhibit bedding plane discontinuities and settling features, limestone</li> </ul>	
190 -147.8				<del></del>	Ш	moderately fossiliferous (casts)	_
-147.0	R20-SN			-	Ш	_	-
-	10 ft		NA	-	Ш	-	-
-	100%			-	Ш	-	-
				-	Ш		-
					Ш	-	]
-				-	Ш	-	_
-				-	Ш	-	-
- 195				-	Ш	-	-
-152.8				_	Ш	_	
	196.0				Ш		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-05	SHEET	11	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		(n	DISCONTINUITIES	ניז	LITHOLOGY	COMMENTS
DEPTH BELOV SURFACE ANI ELEVATION (f	RUN, IH, AND VERY (%		m				
	CORE LENG RECO	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
200_ -157.8	R21-SN	NA	NA	196.0-206.0' - NA		Limestone  194.1-204.7' - very pale orange, (10YR 8/2), very fine grained, mild to moderate HCl reaction, with sub-horizontal, thin (<1/8") beds with apparent organic partings above a very broken (in angular, sharp fragments) very fine grained limestone with fragments showing possible subsidence features (cracks)  Disaggregated Interbedded Limestone 204.7-206.0' - very pale orange,	The rock fragments (195.5-196.0') appear to have been broken by the drilling method Possible collapse infilling, or extremely broken from the drilling method
210 -167.8	R22-SN 10 ft 100%		NA	206.0-216.0' - NA		(10YR 8/2), moderate to strong HCI reaction, very tacky when wet  Disaggregated Interbedded Limestone With Limestone Fragments  206.0-210.5' - Same as 204.7-206.0' except with sandy silt and gravel-sized limestone fragments, where the limestone fragments are very angular to generally sub-rounded, fragments constitute  35-50% of the total material, thin micritic layers/fragments found at 209.8' and 214.0'  Disaggregated Weak Limestone  210.5-213.5'  Disaggregated Interbedded Limestone With Limestone Fragments  213.5-216.0' - Same as 206.0-210.5'	This interval appears as repetitive units, ie. a fossil cast/mold rich generally friable limestone grading into a very fine grained micritic limestone, with limestone fragments up to 1-1/2", many of the limestone "fragments" are adhesions of sand sized carbonate grains that are quite friable, they may be weak rock, but became disaggregated due to the sonic drilling method



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	6/07 START : 2/9/2007 END :	2/12/200	7 LOGGER : M. Faurote, J. Burkard	
≥∩ ∵	(9)			DISCONTINUITIES	ပ္	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R23-SN 10 ft   95%		NA	216.0-226.0' - NA		Disaggregated Fossiliferous Limestone 216.0-225.5' - grayish orange to grayish orange pink, (10YR 7/4 to 5YR 7/2), moderate to strong HCI reaction, friable and pliable, with carbonate derived sand and silt-sized grains that react to HCI, thin (<1" to 2") layers with a 10-15% clay content and higher plasticity, sparse rock fragments consisting of very fine grained, fossiliferous (casts) limestone that exhibits HCI reactions primarily in void filling or along partings	At 218.5' there are apparent carbonaceous organic materials, but they are degraded
-182.8			ND		$\Box$	No Recovery 225.5-226.0'	
	R24-SN 10 ft 100%		NR NA	226.0-236.0' - NA		Disaggregated Fossiliferous Limestone 226.0-236.0' - Same as 216.0-225.5'	
_	236.0					-	
	236.0				冊		



PROJECT NUMBER:	BORING NUMBER:				
338884 FI	I-05	SHEET	12	OE 14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	5/07 START : 2/9/2007 END : 2/1	12/20	D7 LOGGER : M. Faurote, J. Burkard	1
≥∩≘	(%)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
ELO N (f	AND ₹	_	ZES T	DESCRIPTION	CLC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%) Q	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP- SURI ELE/	COR	ROI	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
		_			ш	Disaggregated Fossiliferous	
-				-		<ul> <li>Limestone</li> <li>236.0-246.0' - Same as 216.0-236.0'</li> </ul>	At 236.5' - very fine
-				236.0-246.0' - NA	$\vdash$	except with occasional limestone	grained, small (1/2"x3/8") – limestone fragment is
-				-	$\Box$	- fragments	moderate orange pink (5YR 8/4), with very few
					H	_	fossil casts, strong HCl
_				_		_	reaction
-				_	H	_	_
240 -197.8				_	H	_	
-197.6	R25-SN			-	H	_	-
-	10 ft	NA	NA	-	H	-	-
-	100%			-	Ш	-	-
-				-	Ш	-	All of these samples were
-				-	Ш	-	split with the spatula blade and one-half the core was
-				-		_	placed in the core box; very
						_	few rock fragments impeded the cut
_				_	Ш	_	_
245_ -202.8					Ш	_	TI 5 100 001 5 1 111
-202.8				-	П	_	The final 20-30' of drilling was quite difficult, and
-	246.0			-	Ш	246.0-254.5' - very pale orange,	many runs in and out were _ required to drill the hole
-				-	Ш	<ul> <li>(10YR 8/2), strong HCl reaction,</li> </ul>	and maintain the borehole; -
-				246.0-256.0' - NA	Ш	fragments of very fine grained fossiliferous limestone at 247.5'	some of the rock appears completely broken due to
-				-	Ш	<ul> <li>exhibit very sharp angular edges, fragments are easily broken, a</li> </ul>	the drilling technique -
-				<del>-</del>		fragment at 254.3' shows a nearly	=
-				_		<ul> <li>horizontal contact between fossiliferous (casts) and very fine</li> </ul>	=
					Ш	grained limestone, both exhibiting strong reactions to HCl, the rock	
250_						character change is obvious	
-207.8 -	DOC ON		NA	-		_	-
-	R26-SN 10 ft			-	Н	_	-
-	85%			-	H	-	-
-				<del>-</del>	H	-	-
-				-	H	<del>-</del>	-
1 -				-	Ħ	-	=
1 -				<del>-</del>	H	_	-
					H	_	
25 <u>5</u> -212.8					H	No Recovery 254.5-256.0'	
-212.8			NR	_	H	- -	_
	256.0				H		-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-05	SHEET	14	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1724148.8 N, 457804.5 E (NAD83)

ELEVATION: 42.2 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	6/07 START : 2/9/2007 END : 2	/12/20	07 LOGGER : M. Faurote, J. Burkard	
>00	(9)			DISCONTINUITIES	ŋ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R27-SN 10 ft 100%		NA	256.0-266.0' - NA		Disaggregated Limestone With Limestone Fragments 256.0-259.7' - light brown, (5YR 6/4), fine to medium grained, moderate to strong HCl reaction, composed of carbonate derived grains, <15% gravel-sized limestone fragments (angular, <1" in size, typically micritic)  259.7-265.0' - light brown, (5YR 6/4), moderate HCl reaction, limestone fragments average less than 1" in size	- - - - - - - -
- - - - 265 -222.8 -	266.0		NA	-		Disaggregated Limestone 265.0-266.0' - moderate orange pink, (5YR 8/4), contains no limestone fragments 266.0-267.5' - 1.5' recovered	Drilled to 266.0', driller dropped casing twice and had to retrieve; retrieval process resulted in extending the boring's total depth to 271.0' in order to
 - - 270 -227.8	5 ft 30%	NA	NR	266.0-271.0' - NA		No Recovery 267.5-271.0'	recover casing and core
	271.0			-		Bottom of Boring at 271.0 ft bgs on 2/12/2007	Total depth of boring is 271.0' -



PROJECT NUMBER:	BORING NUMBER:				
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# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache ELEVATION: 42.3 ft (NAVD88)

### SAMPLE REVELS: 4.41 bgs on 39897  ### STANDARD   ST	DRILLIN	G METH	OD AND	EQUIPM	ENT : Rotosonic S	6/N SR-116, sonic, 6" outer casing and 4" core barrel		ORIENTATION : Vertical
SAMPLE NTERVAL (III) RECOVERY 97 (19 or 19	WATER	LEVELS	: 4.41 bg	s on 3/6/0	)7 S	TART : 3/7/2007 END : 3/10/2007 LOGGER	: C.	Sump
Topsoil   Tops						SOIL DESCRIPTION	၅	COMMENTS
Topsoil   Tops	ANC ANC	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	SOIL NAME LISCS CROLID SYMPOL COLOR	ССС	DEDTH OF CASING DOLLING BATE
Topsoil   Tops	H BE ACE		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR	30LI	DRILLING FLUID LOSS, TESTS, AND
Topsoil   Tops	EPT URF			#TYPE		CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYME	INSTRUMENTATION
3.3.4.5 - Ight (raw, (NT to NB), fine grained, 10-15% sillicially increasing with depth, carbonate matrix, silica sand 2-102" limestone fragment at 4.3.3.5" (very pale orange [10 ft Re2], fossiliferous [molds/casts], strong HCl reaction] No Recovery 4.5-6.0"  Poorty Graded Sand (SP) 6.0 -7.0" - Ight gray, (N7), brownish black (5YR 2/1) organic material (slough)  Silty Sand With Limestone Fragments (SM) 7.0-8.5" -3" yellowish gray (5Y 8/1), disc shaped, rounded clast 47.4"  Sandy Silt (ML) 8.5-1.5" -< 10% fine gravel clasts (<1/2"), large concretionary limestone masses (possible stromatolites) at 10° that have botyoidal, non-concentre, globular appearance, and a strong reaction to HCI, medium strong (R3), portion at 14.5" has a tapered horn shape  10.0 R2-SN  10.0 R2-SN  11.0 R2-SN  15.0-16.0" - Same as 8.5-15.0" except grayish orange, (10YR 7/4), moderate to strong HCI reaction, weak (R2), tim bedding plane fractives (14-34"), finable, carbonate (16.0-26.0" - Same as 15.0-16.0" except norplastic to low plasticity, very fine sand-sized particles decreasing with depth, trace this gravel-sized limestone tragments, carbonate materials	42.3 - - -	0.0	4.5	D4 CN	(14)	0.0-0.3' - brownish black, (5YR 2/1), organic rich  Poorly Graded Sand Grading To Poorly Graded Sand With Silt (SP-SM)  0.3-3.3' - brownish black grading to grayish orange, (5YR 2/1 grading to 10YR 7/4), fine grained, fines increase with depth to 10-15%, HCl reaction in fines,		lengths (6' in 10' core barrel) "Water level is based on Ground Water Monitoring at LNP site (FSAR Table
Poorty Graded Sand (SP) 6.0-7.0 - Iloht gray, (N7), brownish black (5YR 2/1) organic material (slough) Sity Sand With Limestone Fragments (SM) 7.0-8.5 - 3" yellowish gray (5Y 8/1), disc shaped, rounded clast at 7.4'  Sandy Sit (ML) 8.5-15.0" - <10% fine gravel clasts (<1/2"), large concretionary limestone masses (possible stromatolities) at 10 that have botryoidal, non-concentric, globular appearance, and a strong reaction to HCI, medium strong (R3), portion at 14.5' has a tapered horn shape  15.0-16.0" - Same as 8.5-15.0" except grayish orange, (10YR 7/4), moderate to strong HCI reaction, weak (R2), thin bedding plane fractures (1/4-3/4"), friable, carbonate 16.0-26.0" - Same as 15.0-16.0" except norplastic to low plasticity, very fine sand-sized particles decreasing with depth, trace fine gravet-sized limestone fragments, carbonate materials			4.5	R1-SN		silt/clay increasing with depth, carbonate matrix, silica sand, 2-1/2" limestone fragment at 4.3-3.5' (very pale orange [10YR 8/2], fossiliferous [molds/casts], strong HCI reaction)		- - -
	32.3		10.0	R2-SN		6.0-7.0' - light gray, (N7), brownish black (5YR 2/1) organic material (slough)  Silty Sand With Limestone Fragments (SM) 7.0-8.5' - 3" yellowish gray (5Y 8/1), disc shaped, rounded clast at 7.4'  Sandy Silt (ML) 8.5-15.0' - <10% fine gravel clasts (<1/2"), large concretionary limestone masses (possible stromatolites) at 10' that have botryoidal, non-concentric, globular appearance, and a strong reaction to HCl, medium strong (R3), portion at 14.5' has a tapered horn shape  15.0-16.0' - Same as 8.5-15.0' except grayish orange, (10YR 7/4), moderate to strong HCl reaction, weak (R2), thin bedding plane fractures (1/4-3/4"), friable, carbonate 16.0-26.0' - Same as 15.0-16.0' except nonplastic to low plasticity, very fine sand-sized particles decreasing with depth, trace fine gravel-sized		euhedral crystals (associated with globular - concretionary masses), smoky clear with tetrahedral form well defined, twinning



PROJECT NUMBER:	BORING NUMBER:					
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# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS	: 4.41 bg	s on 3/6/0	)7	START : 3/7/2007 END : 3/10/2007 LOG	GGER :	C.	Sump
					SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA		STANDARD PENETRATION TEST RESULTS	SOIL NAME LISCS CROUD SYMBOL COLOR		SYMBOLIC LOG	DEDTH OF CASING DOLLING DATE
TH BE		RECOVE			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		BOLI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEP] SURF			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTATION
22.3								
-		10.0	R3-SN			]		_
-		10.0	110 011			- 4		_
-						-		-
-								-
-						- 1		-
-						- 1		-
						]		
25								
17.3						- 4		-
-	26.0				26 0-30 3' - Same as 16 0-26 0' except no very fine			-
-					26.0-30.3' - Same as 16.0-26.0' except no very fine sand, no fine gravel-sized limestone fragments			-
-						- 1		-
-						1		-
						]		_
-						- 4		-
-								-
30 <u> </u>					Begin Rock Coring at 30.0 ft bgs See the next sheet for the rock core log		Ш	
-					See the next sheet for the rock core log	-		-
-						1		-
-						]		
_						4		-
-						-		-
-						-		-
-						1		-
35						1		
7.3								
-						_		-
-								-
-						+		-
-						+		-
-						1		-
						]		
-								
40						$\dashv$		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-06	SHEET	3	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

CORING	IVILITIOD A	ND E	ZUIFIV	IENT: Rotosonic S/N SR-116, sonic, 6" outer casing and	14 (	Jore	Darrei	ORIENTATION : Vertical
WATER	LEVELS: 4.4	11 bgs	on 3/6	6/07 START : 3/7/2007 END : 3/	10/2	007	LOGGER : C. Sump	
				DISCONTINUITIES	T		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		(n	DESCRIPTION	- P			
ON A	Z,A,Z	_	FRACTURES PER FOOT	DESCRIPTION	- □	1	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
ATI(	TH,	(%) Q		DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SYMBOLIC	1	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
FR	NG SCC	ØΒ	R F	PLANARITY, INFILLING MATERIAL AND	Æ		AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
ESE	222	ď	뜐핊	THICKNESS, SURFACE STAINING, AND TIGHTNESS	တ်		CHARACTERISTICS	Briol of February 170.
12.3	30.0				Ш			
_				30.3-36.0' - NA	₩	╁	Limestone	-
_					╂Т	╁	30.3-36.0' - grayish orange and medium gray, (10YR 7/4 and N5),	-
					Д	1	moderate to strong HCl reaction,	_
					Н	-[	medium strong (R3), thin to medium	
_					Ħ	十	bedding, horizontal partings 3/4"-4",	-
_	R4-SN				Е	1	numerous small (1/32"-1/8") voids,	_
_	6 ft	NA	ا ا		₽	╁	few (<3/4") cavities, fossiliferous with	
	100%		NA				significantly more molds than casts, thin horizontal zones (possibly beds)	NA = Not Applicable
					Н	-	of fine grained limestone with no	NR = No Recovery -
-				•	₩	十	voids; 1/2"-4" thick (1"-3" average)	-
-					┨	1	silt/clay interbeds with gravel-sized	_
35					ᅪ	┺	limestone fragments, light gray (N6) grading to medium dark gray (N4)	
7.3					Н	1	with depth, sharp contacts	
1 7	36.0				П	Ŧ	Lope, one position	_
-	36.0			36.0-46.0' - NA	+	+	Sandy Silt With Limestone	-
_					$\parallel \parallel$	⊩	Fragments (ML)	-
_				_	Ш	L	36.0-46.0' - moderate yellowish	_
					Ш		brown, (10YR 5/4), nonplastic to low	
				-	111		plasticity, moderate HCl reaction, fine gravel-sized fragments (<10%) <1/2"	_
-				-	Ш	F	diameter, <10% very fine to fine	<del>-</del>
-					$\  \ $	⊩	sand-sized, dark brown organic	_
_					Ш	L	material at 42.0'	_
					Ш			
40					111	ľ		_
2.3				<del>-</del>	111	H	•	<del></del>
	DE 011				$\parallel \parallel$	ŀ		_
	R5-SN 10 ft	NA	NA			L		_
	100%	INA	INA		Ш			
_				-	111	l		-
-				-	$\parallel \parallel$	ŀ		-
_					411	l		_
1 7					111			_
-					111	1		_
-					$\  \ $	╟		_
-					411	ŀ		_
45					]	lL		_
-2.8				_				
1 -	40.0			-	111	-		_
-	46.0			46.0-56.0' - NA	$\  \ $	<b> </b> -	46.0-52.5' - Same as 36.0-46.0'	_
_				TO.U-0U.U - INA	411	I	except coarse grained sand-sized	_
							limestone fragments, dark brown	
1 7					111	Г	organic mottling, 10% to >50% sand	_
-					111	1	content, <10% fine gravel-sized	_
-					$\  \ $	ŀ	limestone fragments	_
1 _					]	L		_
1 -				-	111			-
				-	$\  \ $	<b> </b>		-
50					ш	4		
						1		



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	S/07 START : 3/7/2007	END : 3/1	0/20	07 LOGGER : C. Sump	
≥0₽	(%			DISCONTINUITIES		9	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	~	FRACTURES PER FOOT	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
TH B	RE RI GTH OVE	(%) O	CTU	DEPTH, TYPE, ORIENTATION, ROUGHNE PLANARITY, INFILLING MATERIAL AN	ESS,	BOL	WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COF LEN REC	S O	FRA	THICKNESS, SURFACE STAINING, AND TIGH		SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-7.8						Ш		
_	R6-SN	NIA	NIA				-	-
	10 ft 100%	NA	NA					
_							_	
_					_	Ш		
_					-		Limestone 52.5-52.8' - yellowish gray, (5Y 7/2),	П -
_							fossiliferous (significantly more molds than casts), numerous	-
-					-		<1/32"-1/8" voids, very few small	-
55					-		cavities 1/4"-1/2" diameter, full diameter core fragments; horizontal,	-
-12.8							smooth, planar partings; thin silty clay coating on fracture surface	_
_	56.0				7		Sandy Lean Clay With Limestone	1
				56.0-66.0' - NA	]		- <b>Fragments (CL)</b> 52.8-56.0' - 15-25% subangular to	
							subrounded gravel-sized (1/2"-1") limestone fragments	
_					-		56.0-61.0' - Same as 52.8-56.0'	_
_					-		except 10-20% gravel-sized - moderate yellowish brown limestone	-
_					-		fragments	-
-					-		-	=
60 60					- 1		-	-
-17.8								
	R7-SN 10 ft	NA	NA		]			_]
_	100%	INA	INA		4		Interbedded Limestone And Clay  61.0-63.4' - light medium gray (clay),	
_					4		(N6), moderate to strong HCI reaction, few fossils or surface voids	-
_					-		<ul> <li>or cavities, dark brown/black</li> </ul>	-
-					+	Ι	laminated inclusions, thin partings every 1"-3"	-
-					-		Disaggregated Limestone	-
-					1		_ 63.4-66.0' - moderate yellowish brown, moderate to strong HCl	-
65					1		reaction, mostly very fine sand-sized limestone fragments, with	-
-22.8							gravel-sized limestone fragments	
	66.0				]		similar to 61.0-63.4'	
-				66.0-76.0' - NA	_		<b>Limestone</b> - 66.0-66.9' - Same as 61.0-63.4'	Repeating sequences of mostly thinly bedded –
-					-		except thin bedding and clayey silt interbeds	limestone with silty clay / clayey silt interbeds (1-2")
-					-		<ul> <li>Limestone Fragments</li> </ul>	with larger zones of sandy -
-					-		66.9-68.7' - fine gravel-sized (4"-6") particles, sandy silt, carbonate	silt +/- clay with gravel sized limestone fragments
-					+		– derived	(3-5')
-					-	T	-	Driller's Remark: Difficulty _ advancing 6" casing
70					-		-	1



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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	S/07 START: 3/7/2007 END:	3/10/20	07 LOGGER : C. Sump	
≥ □ ₽	(%			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	~	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
TH B	GTH GOVE	RQD(%)	CTU	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	BOL	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP SUR ELE	COA REC	S O	FRA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-27.8					工	Interbedded Limestone	
	R8-SN				世	- 68.7-73.5' - thin bedding, similar to 66.9-68.7' except increasing interbed	-
	10 ft 100%	NA	NA		$\perp$	thickness with depth (<1"-6"), limestone partings	1
					Ь	L	
_					$\perp$	_	
_					F	-	
_					$\perp$	- Bi	-
_					$\perp$	Disaggregated Limestone - 73.5-76.0' - moderate HCl reaction,	-
					#	_ 10-20% gravel-sized (1/2"-1") limestone fragments, carbonate	-
75 <u> </u>					士	— derived material	
-	76.0				廿	-	-
-	76.0			76.0-86.0' - NA	$\perp$	- 76.0-83.0' - 20-50% gravel-sized	Driller's Remark: Extremely
-					+	<ul> <li>limestone fragments, dark brown organic silt laminae, coarse sand</li> </ul>	difficult advancing 6" - casing, lost drilling fluid
-					$\top$		circulation
					$\blacksquare$	_	-
					丁		
					厂	_	
_					上	<del>-</del>	_
80 <u> </u>					ፗ	_	
-57.0	R9-SN				$\pm$	-	-
-	10 ft	NA	NA		$\pm$	-	-
-	100%				$\pm$	-	-
-					+	-	-
-					+	-	-
_					$\top$	Limestone Fragments	-
					$\perp$	<ul> <li>83.0-86.0' - yellowish gray, coarse sand to coarse gravel-sized</li> </ul>	1
					井	fragments (1/4" to >3")	
85					井	_	
-42. <del>8</del>					井	  -	-
-	86.0			86.0-96.0' - NA	片	86 0 86 31 Vellowich grov to ducky	Driller's Remark: Difficult
-				00.0-30.0 - NA	世	86.0-86.3' - yellowish gray to dusky yellow, (5Y7/2 to 5Y6/4), fragments	advancing 6" casing; no -
-					$\perp$	3" diameter 86.3-89.5' - moderate yellowish	drilling mud circulation _
-					+	<ul> <li>brown, moderate HCl reaction,</li> </ul>	-
-					F	30-50% gravel-sized limestone fragments, friable, 30-40% small	-
-					F	<ul> <li>voids (1/32"-1/8"), with coarse sand-sized matrix, thin silty zones</li> </ul>	-
-					拝	with thin (1/4"-1/2") dark brown to	
90					上	<ul> <li>black organic layers</li> </ul>	



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	6/07 START: 3/7/2007 END: 3/	10/20	D7 LOGGER : C. Sump	
≥0 ⊙	(9)			DISCONTINUITIES	ڻ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-47.8 - - - - - - - - - - 52.8	R10-SN 10 ft I 100%		NA	_		Limestone Fragments  89.5-96.0' - moderate yellowish brown, (10YR 5/4), fine grained, strong (R4), >3" diameter limestone fragments with 6"-10" spacing, clayey silt interbeds are mottled pale brown (5YR 5/2) to light olive gray (5Y 5/2), dark brown / black organic laminations/mottling sparse except at 92.0-92.5', gravel-size limestone fragments range from 1/2"-1" diameter and become yellowish gray to light olive gray with depth, few zones of material similar to 86.3-89.5', few fragments with 30-40% voids (1/16"-1/8")	- - - - - - -
100 -57.8 - 105 -62.8 - 1105	96.0 R11-SN 10 ft I 100%	NA	NA	96.0-106.0' - NA		96.0-98.0' - grayish orange pink with olive gray staining on fracture surfaces, (5YR 7/2 with 5Y 5/2), irregular zones of small voids  (1/32"-1/8") with fossil molds and casts, fine sand-sized limestone particles  98.0-98.4' - Same as 96.0-98.0' except silty clay infilling on 1"-2" horizontal partings  Disaggregated Limestone With Limestone Fragments  98.4-106.0' - moderate yellowish brown at 99.0', 90% gravel-sized (1/4"-3/4" diameter) limestone fragments, large (>3" to full core diameter) fragments on approximately 1.0' spacing with fine grained disaggregated interbeds in between, the percentage of larger fragments increases at end of run (>50%)	Driller's Remark: Difficulty establishing correct amount of tube when driving 6" casing (stuck at 5000); difficulty for previous 3 runs (86-116') may increase potential for drill induced breakage and/or segregation of disaggregated material in retrieved cores



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	I-06	SHEET	7	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DISCORTINUTIES   Company	WATER LEVELS : 4	1.41 bg	s on 3/6	6/07 START: 3/7/2007 END:	3/10/20	07 LOGGER : C. Sump	
R12.SN 10 ft 1 MA NA 100% NA NA 116.0-126.0' - NA 116.0-126.0' - NA 116.0-126.0' - NA 116.0-126.0' - NA 126.0-136.0' - N	≥∩a			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
Title   Name	DEPTH BELON SURFACE AN ELEVATION (f CORE RUN, LENGTH, AND RECOVERY (%)	Ø	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
120 -77.8 R13.SN 10.tl NA NA 10.tl NA 100% NA NA 1126.0 126.0-136.0'- NA  126.0-136.0'- NA  116.0-122.0'- Same as 106.0-116.0' except limestone fragments (33-4') are irregularly shaped, angular to subangular, grave-lized limestone fragments (30-80%), in silf-sized to sand-sized disaggregated limestone material  Interbedded Limestone And Clayey Silt 122.0-123.5'- dusky yellowish brown limestone, medium strong (R3), very thin to thin bedding, few small voids (1/32-1/8), 6% dark yellowish gray horizonal banding, horizontal partings 2'-4' with clayey carbonaceous silt interbeds (1'-3') contains limestone fragments c1' Limestone Fragments with shaped Limestone 123.5-126.0'- Same as 116.0-122.0' except limestone fragments with shaped and the control of	R12-S - 10 ft 1009	NA	NA			- Disaggregated Limestone  106.0-116.0' - moderate yellowish brown, (10YR 5/4), moderate HCl - reaction, fragments (3"-4") comprise >50% of core at top of run, decreasing with depth to 15-30% as - core material becomes more disaggregated, matrix is disaggregated limestone and smaller (<1") limestone fragments, fragments exhibit small voids (25-30% of surface) and few (<5%) fine black - horizontal (possibly organic) laminae (3/16"-3/8" long), interval at 114.0-114.5' is pale yellowish brown (10YR 6/6) fine grained limestone, strong (R4), with no small voids or	- - - - - - -
Silt 122.0-123.5' - dusky yellowish brown limestone, medium strong (R3), very thin to thin bedding, few small voids (1/32"-1/8"), 5% dark yellowish gray horizontal banding, horizontal partings 2"-4" with clayey carbonaceous silt interbeds (1"-3"), contains limestone fragments <1" Limestone Fragments With Disagregated Limestone 123.5-126.0' - Same as 116.0-122.0' except limestone fragments with sandy silt with gravel Limestone 126.0-127.0' - coarse sand-sized carbonate derived material grading to silty fine sand with 3"-4" limestone fragments 127.0-127.7' - yellowish gray, (5Y 7/2), medium strong to strong (R3 to R4), trace small voids (1/32"-1/8")	120 -77.8 R13-S	: NA	NA	116.0-126.0' - NA		116.0-122.0' - Same as 106.0-116.0' except limestone fragments (3"-4")     are irregularly shaped, angular to subangular, gravel-sized limestone fragments (30-80%), in silt-sized to sand-sized disaggregated limestone	
	-82.8 126.0			126.0-136.0' - NA		- Silt  122.0-123.5' - dusky yellowish brown limestone, medium strong (R3), very thin to thin bedding, few small voids (1/32"-1/8"), 5% dark yellowish gray horizontal banding, horizontal partings 2"-4" with clayey carbonaceous silt interbeds (1"-3"), contains limestone fragments <1"  Limestone Fragments With Disaggregated Limestone  123.5-126.0' - Same as 116.0-122.0' except limestone fragments with sandy silt with gravel  Limestone  126.0-127.0' - coarse sand-sized carbonate derived material grading to silty fine sand with 3"-4" limestone fragments  127.0-127.7' - yellowish gray, (5Y 7/2), medium strong to strong (R3 to R4), trace small voids (1/32"-1/8")	- - - - - - - - - - - - - - - - - - -



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	I-06	SHEET	8	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 4.4	1 bgs	on 3/6	S/07 START: 3/7/2007 END: 3	/10/20	07 LOGGER : C. Sump	
30€	(%			DISCONTINUITIES	_ g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(a)	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
TH B	RE RI GTH SOVE	(%) Q	CTU	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	1BOL	WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEF SUF ELE	COF	RQ	FRA	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYN	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
-87.8					H	Limestone	
	R14-SN 10 ft		NA		工	- 127.7-133.0' - limestone fragments 2"-4" diameter with varying amounts	
_	100%	INA	INA		耳	of fine grained disaggregated - limestone, interval at 128.5-129.0'	_
_					上	has 3 full size core fragments with	_
_					上	fragments in between and exhibits fine (1/10"-1/2") bedding planes	_
-					士	133.0-134.9' - yellowish gray, (5Y 7/2), similar to 127.0-127.7',	-
-					士	<ul> <li>horizontal partings vary from 1"-7", light gray clayey silt infilling on</li> </ul>	-
_					$\pm$	partings	-
135					$\perp$	-	-
-92.8				<del>-</del>	压	134.9-136.0' - limestone fragments with sandy silt to gravel-sized	
	136.0				$\mathbb{H}$	fragments, angular to subangular, similar to above except more silt to	
_				136.0-146.0' - NA	$\perp$	sand-sized particles '	Driller's Remark: Advancing 6" casing -
_					+	136.0-141.0' - medium gray intermixed with yellowish gray, (N6	becoming easier (better rock)
-					$\mathbf{H}$	with 5Y 7/2), moderate to strong HCl reaction, medium strong (R3),	- TOCK)
-					$\blacksquare$	fragmented, fossiliferous (molds &	-
-					F	casts), large burrows (1/2" wide, 3"-4" long), voids in irregular zones	-
-					F	up to 30% surface), cavities (1/2" diameter, circular), fragments 1"-4"	-
140					Ħ	diameter/length, lack of fines except in interval at 140.0-140.4' which is	-
-97. <del>8</del>			NA		厈	medium brown, fine grained	
_	R15-SN 10 ft				F	disaggregated limestone (5-10% silica grains) with moderate HCl	_
_	86%				#	reaction 141.0-143.4' - with limestone	_
-					Ħ	<ul> <li>fragments up to 3", intact core</li> </ul>	-
-					井	sections up to 0.3' in length	-
-					廿	-	-
-					#	Disaggregated Limestone 143.4-144.6' - mild to moderate HCl	
					]	reaction, 10-20% silica grains	
145				_	井	No Recovery 144.6-146.0'	
-102.8 -			NR		#	-	-
-	146.0			146.0-156.0' - NA	井	Limestone Fragments	-
-				110.0 100.0 101	廿	<ul> <li>146.0-147.6' - very coarse grained,</li> </ul>	-
-					廿	with >50% of fragments 1/4" or larger, grading to coarse sand-sized	-
-					廿	with 2"-3" limestone fragments, all carbonate derived	-
-					1	147.6-147.9' - yellowish brown, - 1-1/2"-2" thick, no interbed	
					上	147.9-151.0' - similar to 147.6-147.9',	
					上	bedding plane parting evident 1/2"-3/4" thick	
150					$\perp$		
			L				



PROJECT NUMBER:	BORING NUMBER:					_
338884 FI	1-06	SHEET	۵	OE	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	5/07 START : 3/7/2007	END: 3/1	0/20	D7 LOGGER : C. Sump	
≥∩ ∵	<u></u>			DISCONTINUITIES		ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHN PLANARITY, INFILLING MATERIAL AI THICKNESS, SURFACE STAINING, AND TIC	ND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-107.8 - - - - - - - - - - - - - - - - - - -	R16-SN 10 ft 100%		NA	156.0-166.0' - NA			Limestone  151.0-151.8' - medium strong to strong (R3 to R4), fossiliferous (molds & casts), voids (1/32"-1/8") < 5% Limestone Fragments  151.8-153.9' - Same as 151.0-151.8' except 1" thick  Disaggregated Limestone  153.9-155.0' - with gravel-sized limestone fragments, some dark brown mottling, possible organics Limestone  155.0-155.4' - Same as 151.0-151.8' Disaggregated Limestone	-
- - - 160 -117.8 -	R17-SN 10 ft 100%	NA	NA	156.0-166.0' - NA			Limestone Fragments  155.4-156.0' - Same as 153.9-155.0  Limestone Fragments  156.0-166.0' - moderate yellowish brown to medium light gray, (10YR 5/4 to N6), strong (R4), with thin yellowish gray/dark brown sandy silt layer (1-1/2"-2" thick) at 158.0' and 159.0', few full core diameter limestone fragments 2"-3" thick at 161.0-163.0' with smaller fragments in between, disaggregated limestone increasing with depth at 164.5-166.0', fragments are medium strong to strong (R3 to R4), with trace small voids (1/32"-1/8") and cavities (<3/4" diameter) at 161.4-162.6' and 165.5-166.0', fragments are generally thin, partial disc shaped fragments that appear to be breaking on bedding plane surfaces, full core diameter limestone fragments at 158.6-159.0'	- - - - - - - - - -
-165 -122.8 - - - - - - - - - - - - - - - - - - -	166.0			166.0-176.0' - NA			Disaggregated Limestone  166.0-166.9' - with gravel-sized limestone fragments Limestone Fragments 166.9-167.7' - yellowish gray to light olive gray, medium strong to strong (R3 to R4), 1"-3" partings, clayey silt-sized infilling Limestone Fragments With Disaggregated Limestone 167.7-169.3' - fragments 1"-1-1/2" diameter, angular to subangular	Driller's Remark: Segregated by drilling



PROJECT NUMBER:

33884.FL BORING NUMBER:

I-06 SHEET 10 OF 14

### **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	6/07 START : 3/7/2007 END : 3/	10/200	7 LOGGER : C. Sump	
≥∩≘	_ (%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-127.8       175 -132.8	R18-SN 10 ft I 100%		NA			Limestone Fragments  169.3-171.6' - limestone with clayey silt light gray (N4) interbeds, limestone 1"-3" thick with interbeds  1"-2" thick  171.6-176.0' - limestone fragments (2"-4") with variable amounts of disaggregated limestone, full core diameter, limestone fragments from  173.1-173.3' and 175.4-176.0' are 2-1/2"-3" thickness	- - - - - -
- - - - 180 -137.8 - -	176.0 R19-SN 10 ft I 100%	NA	NA	176.0-186.0' - NA		176.0-176.2' - dense, hard, well rounded cobble-sized limestone fragments, spherical to lenticular, 1"-2" diameter, very fine crystal faces suggest recrystallization, strong HCI reaction when scratched 176.2-183.4' - limestone fragments are fine grained and angular to subangular, increasing disaggregation with depth	- - - - - - - - - - - -
- 185 -142.8 - - - - - - - - - - - - - - - - - - -	186.0			186.0-196.0' - NA		Disaggregated Limestone With Limestone Fragments 183.4-184.3' - gray clayey silt-sized limestone fragments with gravel-sized limestone fragments (3/4"-1-1/2") 184.3-185.3' - 2"-3" partings/fractures with clayey silt-sized limestone interbeds Disaggregated Limestone 185.3-186.0' - with gravel-sized limestone fragments 186.0-187.0' - disaggregated limestone Limestone With Limestone Fragments 187.0-188.9' - medium strong (R3), fragments are 2"-4" size, fossiliferous (molds and casts), cavities (1/2")	Driller's Remark: Segregation due to drilling



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-06	SHEET	11	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	6/07 START: 3/7/2007 END: 3/	10/20	D7 LOGGER : C. Sump	
≥∩≘	_ (%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-147.8 	R20-SN 10 ft I 100%		NA			Limestone  188.9-189.7' - strong (R4), trace fossils/voids Limestone Fragments  189.7-192.0' - coarse sand-sized grading downward to gravel-sized limestone fragments (2"-4")  192.0-192.2' - medium strong to strong (R3 to R4), moderate yellowish brown limestone breccia  192.2-196.0' - limestone fragments with coarse sand/fine gravel-sized disaggregated limestone, full core diameter limestone fragments at 192.0' and 196.0'	- - - - -
	R21-SN 10 ft 100%	NA	NA	196.0-206.0' - NA		Limestone With Limestone Fragments 196.0-206.0' - moderate yellowish brown to grayish yellow, medium strong to strong (R3 to R4), limestone and fragmented limestone, fossiliferous with molds & casts to 10%, voids (1/32"-1/8") variable with depth and occurring in discreet zones (up to 40% of surface area), cavities roughly circular with diameters to 1", fine grained strong (R4) rock at 201.0-201.4'	- - - - - - - - - - - - - - - - - - -
205 -162.8 - - - - - - - - - - - - - - - - - - -	206.0			206.0-216.0' - NA		Limestone Fragments  206.0-207.5' - light olive gray, (5Y 5/2), fossiliferous, fragmented (2 full core diameter fragments), fossil molds and small cavities (<3/4") aligned horizontally along bedding planes, fragments are disc shaped 1/2"-3/4" thick with clayey silt on parting surfaces (thin beds)	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-06	SHEET	12	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER I	_EVELS : 4.4	1 bgs	on 3/6	6/07 START: 3/7/2007 END: 3	/10/20	07 LOGGER : C. Sump	
≥∩≘	- (°)			DISCONTINUITIES	၂ ဖွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-167.8 - - - - - -	R22-SN 10 ft 85%		NA		- 1	Limestone Fragments  - 207.5-214.5' - silty to sandy gravel-sized limestone fragments, fragments vary from to 50 to >90% of core and range in size from 1/2" to >3" diameter, medium brown silt layer at 213.5' (organics)	- - - - - -
215 -172.8 -	216.0		NR	- 216 0-226 0' - NA		No Recovery 214.5-216.0'	- - - -
- 220 -177.8 	R23-SN 10 ft 1 90%	NA	NA	216.0-226.0' - NA		Limestone  216.0-225.0' - similar to 207.5-216.0', repeating sequence of (2"-4") angular limestone fragments and few full core diameter disc shaped fragments with sandy to silt with gravel-sized limestone fragment layers (1.0-2.0' thick)  Limestone Fragments  217.2-217.6' - light olive gray, highly fossiliferous limestone fragments, large molds and casts (>1/2")  (brachiopods), dark gray/black pyritic surface staining on parting surfaces and often restricted to fossil molds 217.6-219.3' - highly fragmented limestone, few fossils/voids  Limestone Breccia  219.3-219.6' - light yellowish gray, medium strong (R3), with olive gray angular clasts, pyrite on fracture surfaces  Disaggregated Limestone 220.0-222.4' - with gravel-sized limestone fragments (<1")  Limestone  222.4-222.8' - 1" thick limestone beds	- - - - - - - - - - - - - - - - - - -
-182.8	226.0		NR	226.0-236.0' - NA		Disaggregated Limestone  222.8-225.0' - with gravel-sized  limestone fragments (1/4" to >1" diameter), large (>3") fragments, olive gray highly fossiliferous limestone at end of run (225.0')  No Recovery 225.0-226.0' Limestone  226.0-227.0' - solution cavities (1/4"-1/2" diameter up to 1" length/depth) and/or burrows, very fossiliferous, with molds (brachiopods) exhibiting horizontal alignment (bedding plane orientation)	- - - - - -



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-06	SHEET	13	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	6/07 START: 3/7/2007 END: 3/	10/20	07 LOGGER : C. Sump	
≥0 ⊙	(9)			DISCONTINUITIES	ڻ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-187.8 - - - - - - 235 -192.8	R24-SN 10 ft 100%		ΣA			Limestone  227.0-228.0' - fine grained, few fossils or cavities exhibiting pronounced bedding plane parting  (1/4"-1/2" thick), highly fragmented 228.0-236.0' - disaggregated, coarse sand and fine gravel-sized (<1/2"), limestone fragments (1"-3") silt and fine sand-size percentage varies but is <15%, except medium brown sandy silt with <10% small (<1/4") limestone fragments at 232.0-232.5'	- - - - - -
240 -197.8 -	236.0 R25-SN 10 ft 100%	NA	NA	236.0-246.0' - NA		236.0-246.0' - Same as 228.0-236.0' except medium brown with gravel-sized fragments (<15%)	
-202.8 - - - - - - - - 250	246.0			246.0-256.0' - NA		TEAUTOTT	Driller's Remark: 6" casing advanced very easily



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-06	SHEET	14	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723163.0 N, 457960.6 E (NAD83)

ELEVATION: 42.3 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	5/07 START : 3/7/2007 Et	ND: 3/10/	200	7 LOGGER : C. Sump	
≥∩≘	_ (9			DISCONTINUITIES		ي ا	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNES PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHT	SS,	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-207.8 - - - - - - -	R26-SN 10 ft 85%		NA				246.0-254.5' - Same as 236.0-246.0' except except single full size diameter limestone fragment at 252.0', cone shaped with very thin dark brown horizontal laminations (< 1/32"), 1/6" total thickness, 1" diameter limestone fragment immediately above has dark gray/black pyritic coating on two fracture faces; medium yellowish brown sandy silt with fine gravel-sized fragments (<10%, 1/4"-1/2" diameter) at 253.4-253.5'	- - - - - -
255_ -212.8			NR		-		No Recovery 254.5-256.0'	_
260 -217.8 -	256.0 R27-SN 10 ft 92%		NA	256.0-266.0' - NA			Limestone 256.0-265.2' - disaggregated, with limestone fragments, same as 253.4-253.5', fragments 1"-3" diameter	Driller's Remark: Drilling 6" casing advanced very easily
265 -222.8 -	266.0		NR		<u>+</u>		No Recovery 265.2-266.0'  Bottom of Boring at 266.0 ft bgs on 3/10/2007	-
- - - - - -					- - - - - -	-		- - - - -



PROJECT NUMBER: BORING NUMBER: **I-07** 

338884.FL

SHEET 1 OF 16

# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLIN	DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical									
WATER	LEVELS	: 4.41 bg	s on 3/6/0	)7 S	TART : 2/27/2007 END : 3/7/2007 LOGGER	R : C	C. Sump, J. Burkard			
\$□ ± 1				STANDARD PENETRATION	SOIL DESCRIPTION	۲	COMMENTS			
ELO ON (f	SAMPLE	INTERVA		TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	SYMBOLICLOG	DEPTH OF CASING, DRILLING RATE,			
FH BI		RECOVE	- ' '		MOISTURE CONTENT, RELATIVE DENSITY OR	S	DRILLING FLUID LOSS, TESTS, AND			
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	N X	INSTRUMENTATION			
42.4 - - - - - -	0.0	5.0	R1-SN		Topsoil 0.0-0.7' - dark brownish black, (5YR 2/1), fine silica sand, organic matter  Poorly Graded Sand Grading To Poorly Graded Sand With Silt (SP/SP-SM) 0.7-4.8' - brownish black grading to light gray mottled with dark yellowish orange, (5YR 2/1 to N7 with 10YR 6/6), no HCl reaction, fine silica sand, fines increase to 10% with depth, organics decrease with depth		Note: Retrieved core appears compressed (larger diameter >6"); actual recovery is likely closer to 100% "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" Water levels not recorded during drilling  Coring run times not recorded for I-07			
5 37.4 - -	7.0				Silty Sand / Sandy Silt (SM/ML)  4.8-5.0' - yellowish gray, (5Y 7/2), strong HCl reaction, very fine to fine sand, nonplastic fines, carbonate materials  No Recovery 5.0-7.0'		- - - - -			
- - -	7.0				Poorly Graded Sand (SP) 7.0-8.3' - no HCl reaction, fine silica sand, may be slough material  Silt With Sand (ML)		Retrieved core greater than 10.0 ft; 1.3 ft silica sand may be slough from run R1- SN Two stromatolite-like semi-spherical			
- 10 32.4 - - - -		10.0	R2-SN		8.3-17.0 - grayish orange, (10YR 7/4), nonplastic to low plasticity, strong HCl reaction, <5% coarse sand to fine gravel (1/8"-1/4"), carbonate materials, at 8.0-9.0' are two 4"-5" diameter spherical, hard limestone fragments, with concentric layering/banding, light gray/light olive brown, possible re-crystallization indicated by fine "sparkling" reflective grains	-	structures with concentric layering, nodule at base, fine tube-like branching structures on surface (1/16" wide >1.0" in length), fine dimple pattern on surface			
- - 15 27.4 - - -	17.0				17.0-27.0' - Same as 8.3-17.0' except grades to silty sand with gravel-sized limestone fragments at	-	- - - - - - - -			
- - - 20					19.0-22.0', grades back to silt with sand from 22.0-27.0', fragments are very friable and fossiliferous, with small (1/16") surface voids over 30-40% of surface, strong HCl reaction for both the silt and the limestone fragments, all material carbonate	- - - - - -	-			
						1	1			



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-07	SHEET	2	OF	16

# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

	WATER LEVELS: 4.41 bgs on 3/6/07 START: 2/27/2007 END: 3/7/2007 LOGGER: C. Sump, J. Burkard									
WATER	LEVELS	. 4.41 00	S UH 3/6/(		START : 2/27/2007	GER	. U.	Sump, J. Burkard  COMMENTS		
≩Q₽	041451	INTERVA	1 (6)	STANDARD PENETRATION	GOIL DEGUNIF HON	-	90	OGIVIIVILINIO		
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE		` ,	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,		
ATI B		RECOVE	RY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR		BOL	DRILLING FLUID LOSS, TESTS, AND		
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYM	INSTRUMENTATION		
22.4				(14)		_	Ш			
-						-		-		
-						-		-		
-						-		-		
-		10.0	R3-SN			-		-		
_						-		_		
_						4		-		
_						_		_		
_						_		_		
_						4		_		
25										
17.4								_		
l _										
_										
	27.0						Ш			
					Silty Sand With Limestone Fragments (SM)		Ш	Core "hot" immediately following drilling, likely drying thin layers		
					27.0-29.5' - grayish orange, (10YR 7/4), fine grained, with gravel-sized (1/4"-3/4") limestone fragments			likely drying thin layers		
					(similar to fragments described for 19.0-22.0' above), gravel fragments are <15% of sample, clayey zone at	. 1				
_					29.0' with dark brown silt layer (possible organics), al	ו ד	Ш			
-					carbonate materials			1		
30					Limestone			_		
12.4					29.5-36.6' - pale yellowish brown, (10YR 6/2), core is fragmented, with one piece 8" in length, fossiliferous	· 7		_		
-					(casts/molds), small (1/16"-1/8") surface voids over	- 1	$\overline{}$	-		
_					10-15% of surface, horizontal partings roughly 1"-2-1/2" apart, yellowish gray (5YR 7/2) clayey silt	1		-		
-					interbeds between partings, interbeds average <1"	1	_	_		
-		9.6	R4-SN		and are compacted, between 34.0-35.0' and 36.0-36.7' there are some 12" thick clay/silt interbeds	. 1		-		
-					with 10% coarse sand and fine gravel-sized particles	´ †		-		
-						†	Τ	-		
-						1		-		
-						+	_	-		
							_	-		
35 7.4						$\dashv$	_			
-						+		-		
-						-		Top of rock estimated to be approximately		
-					No Bossyam, 26 6 27 0'		I	37' below ground surface –		
-					No Recovery 36.6-37.0'  Begin Rock Coring at 37.0 ft bgs					
-					See the next sheet for the rock core log	4		_		
-						-		-		
-						4		-		
-						4		-		
-						4		-		
40										



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	I-07	SHEET	3	OF	16	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER LEVELS: 4.41 bgs on 3/6/0			on 3/6	START : 2/27/2007 END : 3/7/2			ე7	LOGGER : C. Sump, J. Burkard	<u>rd</u>			
≥0 ::	(9)			DISCONTINUITIES		Ō	L	LITHOLOGY	COMMENTS			
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTN	S, NESS	SYMBOLIC LOG		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.			
-40 2.4 - - - - - 45 -2.6	37.0 R5-SN 10 ft 100%	NA	NA	37.0-47.0' - NA				Silt And Limestone Fragments (ML) 37.0-47.0' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, with limestone in 1.0' thick interbeds at 4.0' intervals, limestone fragments (1"-3") subangular to slightly subrounded, contains numerous small voids (1/16"-1/8") and are friable (easily broken by hand), all carbonate materials	Start of rock coring  Coring run times not recorded for I-07  NA = Not Applicable NR = No Recovery			
-507.6 	R6-SN 10 ft 92%	NA	NA RR	47.0-57.0' - NA				Disaggregated Weak Limestone 47.0-54.5' - moderate yellow brown, (10YR 5/4), trace (<5%) limestone fragments (1/2"-3/4" in diameter), similar to above except zones containing thin dark brown/black lamination (possible organics)  Limestone 54.5-55.3' - moderate yellowish brown, with light yellowish gray silty clay interbeds, horizontal partings 1/2"-1" with clayey interbeds 1/4"-1/2" thick	Limestone not full core diameter, possible drill induced breakage			
	57.0		NR			Ī	Ł					



PROJECT NUMBER:	BORING NUMBER:			
338884.FI	I-07	SHEET	4 OF	16

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	11 bgs	on 3/6	S/07 START: 2/27/2007 END:	3/7/2007	<ul> <li>LOGGER: C. Sump, J. Burkard</li> </ul>	
300	(0			DISCONTINUITIES	Ú	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
60 -17.6 -	R7-SN 10 ft 95%	NA	NA	57.0-67.0' - NA		Disaggregated Weak Limestone  55.3-56.2' - Same as 47.0-54.5' No Recovery 56.2-57.0' Disaggregated Limestone  57.0-63.0' - very fine grained, <5% limestone fragments (1/4"-3/4" in diameter), few large limestone fragments at 57.4' and 60.0' may represent thin harder limestone interbeds	- - - - - - -
	67.0		NR			Limestone Fragments  63.0-63.5' - fragments are 1"-1-1/2" thick with silty (carbonate derived) material on surfaces, friable, fossiliferous (casts/molds), numerous small (1/16"-3/16") voids covering 50-60% of surface  Disaggregated Limestone 63.5-66.5' - pale yellowish brown, changing with depth to limestone fragments 1/4"-2" in diameter, dark brown/black thin organic rich	- - - - - - -
-0 -0 -0 -27.6 -0 -0 -0 -0	R8-SN 10 ft 96%	NA	NA	67.0-77.0' - NA		lamination  No Recovery 66.5-67.0' Limestone Fragments 67.0-76.6' - interbedded sequences, 4.0-5.0' of limestone fragments (2"-4" size) and disaggregated limestone with <5% small (<1/2") limestone fragments, thinly bedded (1/2"-3/4"), limestone with fine silt material and bedding plane parting 69.0-69.5', very friable, (mild to no HCl reaction on faces, mild reaction on partings), 1/2" thick, dark black laminated organic layer at 74.5' at top of upward fining sequence (silt zone)	- - - - - - - - - - - - - - - - - - -
75 -32.6 - - - -	77.0		NR				- - -
							<u> </u>



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-07	SHEET	5	OF	16	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	R LEVELS: 4.41 bgs on 3/6/07		on 3/6	7 START : 2/27/2007 END : 3/7		LOGGER : C. Sump, J. Burkard	_		
>00				DISCONTINUITIES	υ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
- - - 80 -37.6				77.0-87.0' - NA		Limestone Fragments 77.0-83.3' - Same as 67.0-76.6' except gravel-sized limestone fragments with depth (locally up to 4")	Lost circulation between 77.0-87.0' -		
   85_ -42.6	R9-SN 10 ft 100%	NA	NA			- 83.3-85.6' - 4"-5" limestone fragments, light gray clayey silt with 15% small (1/4"-3/4") limestone fragments	- - - - - -		
	87.0			87.0-97.0' - NA		Limestone  85.6-87.0' - yellowish gray, (5Y7/2), dense, fine grained, fossiliferous (casts/molds), small voids (1/16"-1/8"), 10-15% small cavities (1/2"), 8"-9" core fragment, light gray clayey interbed  Disaggregated Limestone 87.0-92.5' - carbonate derived very fine sand, dark brown/black organic layers (1"-2" thick), limestone fragments, subangular with few subrounded, 75% of limestone fragments are <1" in diameter with large (2"-4") fragments from 91.5-92.5'	- - - - - - - -		
-52.6 	R10-SN 10 ft I 100%	NA	NA			Limestone  92.5-97.0' - moderate yellowish brown, (10YR5/4), fine grained, moderately strong to strong ( to R4), fossiliferous limestone, with variable percentages small surface voids (1/16"-1/8"), small circular solution cavities (<1/2"), clayey silt and limestone interbeds 94.0-94.5' and 94.6-95.0'	- - - - - - - -		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-07	SHEET	6	OF	16	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	WATER LEVELS : 4.41 bgs on 3/6/			6/07 START : 2/27/2007 END : 3/	7/200	LOGGER : C. Sump, J. Burkard			
≥⊖£	(%			DISCONTINUITIES	၅	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
- - - 100 -57.6 - - -	R11-SN 10 ft 96%	NA NA	NA	97.0-107.0' - NA		Limestone 97.0-98.8' - grayish orange, (10YR 7/4), fine grained, trace surface voids or cavities, fine bedding lamination visible in discrete zones, irregularly shaped fragments 98.8-104.1' - moderate yellowish brown, (10YR 5/4), variable density of small (1/16"-1/8") surface voids with few small (<3/4") cavities	SC-1 collected at 99.2- 100.0'		
-105 -62.6 	107.0		NR	107.0-117.0' - NA		Limestone Fragments  104.1-106.6' - large (2"-4") and fine gravel-sized limestone fragments (1/4"-3/4" in diameter), silty and sandy matrix (disaggregated limestone), very weak (R1) at 105.0-106.0'  No Recovery 106.6-107.0'  Disaggregated Limestone 107.0-108.0' - with limestone fragments 1/4"-3/4" in diameter Limestone  108.0-110.9' - pale yellowish gray, (5Y 7/2), fossiliferous (molds & casts) (5%), small voids (1/16"-1/8") 30-40%, roughly circular cavities 1/2"-3/4" in diameter	"Sandy" material at top of run may be the result of segregation during drilling		
-67.6 - - - - - -	R12-SN 10 ft 100%		NA			Limestone Fragments 110.9-113.1' - Same as 108.0-110.9' except larger fragments (3"-4"), with irregular subangular shape  Limestone 113.1-113.9' - Same as 108.0-110.9' except less fragmented	Possible drill induced breakage SC-2 collected at 113.1-		
-11 <u>5</u> -72.6 -	117.0					Limestone Fragments 113.9-114.4' - very friable Limestone 114.4-117.0' - Same as 113.9-114.4' except less fragmented	SC-3 collected at 115.8- 116.6' -		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-07	SHEET	7	OF	16

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	11 bgs	on 3/0	5/07 START : 2/27/2007 END : 3/	7/200	7 LOGGER : C. Sump, J. Burkard	
≥0 ⊕	6)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
120 -77.6	R13-SN 10 ft 100%		NA	117.0-127.0' - NA		Disaggregated Limestone With Limestone Fragments 117.0-121.2' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, gravel-sized fragments are friable limestone, fragments range from 1/4"-1-1/4" with few large 2"-4" fragments  Limestone 121.2-122.0'  Limestone Fragments 122.0-125.4' - moderate yellowish brown, (10YR 5/4), fragments of fine grained limestone in a light gray clayey silt matrix  Limestone 125.4-127.0' - Same as 108.0-110.9' except moderate yellowish brown, fragmented at 126.5-127.0'	Possible drill induced breakage -
-130 -87.6 -87.6 	R14-SN 10 ft 100%		NA	127.0-137.0' - NA		Disaggregated Limestone With Limestone Fragments 127.0-128.0' - moderate yellowish brown, (10YR 5/4), moderate HCI reaction, carbonate derived Limestone 128.0-137.0' - pale yellowish brown, (10YR 6/2), fine to medium grained, strong HCI reaction, limestone beds and fragments, fossiliferous, voids (<1/16") over 75% of surface at 128.0-128.9', 10% voids 128.9-133.0', trace voids on surface 134.0-137.0', interbedded with clay at 133.0-134.0'	- - - - - - - - - - - - - - - - - - -



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	I-07	SHEET	8 OF 16

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	6/07 START : 2/27/2007 END : 3	3/7/200	7 LOGGER : C. Sump, J. Burkard	
> 0	(9)			DISCONTINUITIES	ق	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - 140 -97.6 - -	R15-SN 10 ft 85%		NA	137.0-147.0' - NA		Limestone Fragments  137.0-137.9' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, fragments are well graded gravel-size, carbonate derived Limestone 137.9-138.6' - pale yellowish brown, (10YR 6/2), medium to fine grained, 25-50% voids on surface, possible alteration zone 138.6-143.0' - light bluish gray grading to pale yellowish brown, (5B 7/1 to 10YR 6/2), fine grained, strong HCl reaction, no voids, fossiliferous	- - - - - - - - - - -
- 145_ -102.6 - -	147.0		NR	-		(<1/16") on surface Limestone Fragments  143.9-145.5' - grayish orange, (10YR 6/2), silty sand-sized disaggregated limestone with gravel-sized limestone fragments  No Recovery 145.5-147.0'	Core barrel quickly dropped while drilling - 145.0-147.0'
- - - 150 -107.6 - - - - - - - - - - - - - - - - - - -	R16-SN 10 ft   100%		NA	147.0-157.0' - NA		Disaggregated Limestone  147.0-147.4' - pale yellowish brown, (10YR 6/2), strong HCl reaction Limestone  147.4-152.9' - pale yellowish brown, (10YR 6/2), medium grained, moderate to strong HCl reaction, voids over 5-15% of the surface, fragments vary in size from 1"-6", slight color change (medium bluish gray [5B 7/1]) and possible alteration zone at 151.2-151.6', increase in surface voids to 25-50% at  152.6-152.9'  152.9-154.4' - light brownish gray, (5YR 6/1), medium to fine grained, with fragments ranging from sand-size to 1" in diameter  154.4-155.6' - pale yellowish brown, (10YR 6/2), strong HCl reaction, interbedded clays, trace voids	SC-4 collected at 147.6- 148.4'
-	-112.6 - - - 157.0					Limestone Fragments  155.6-157.0' - Same as 154.4-155.6' except fragmented	-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-07	SHEET	9	OF	16	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 4.4	I1 bgs	on 3/6	5/07 START : 2/27/2007 END : 3/	7/200	7 LOGGER : C. Sump, J. Burkard	
≥ ∩ ⊕	6)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-160 -117.6 -	R17-SN		NA	157.0-167.0' - NA		Disaggregated Limestone With Limestone Fragments 157.0-157.8' - pale yellowish brown, (10YR 6/2), sand-sized disaggregated limestone material, with gravel-sized limestone fragments Limestone 157.8-158.3' - yellowish gray, (6Y 7/2), fine to medium grained, strong HCI reaction 158.3-160.9' - light olive gray, (5YR 5/2), fine to medium grained, strong HCI reaction, delayed HCI reaction, fragmented 160.9-164.6' - light olive gray, (5Y 5/2), fine to medium grained, strong HCI reaction, partially broken into disc-shaped fragments, numerous small solution cavities	- - - - - - - - - - - - - - - - - - -
16 <u>5</u> -122.6 - - - -	167.0		NR			except more fragmented, with silt at bottom of section  No Recovery 166.0-167.0'  Disaggregated Limestone With Limestone Fragments	Possible drill induced breakage 167.3-171.0'
-175 -132.6	R18-SN 10 ft ' 85%		NA	167.0-177.0' - NA		167.0-167.3' - pale yellowish brown, (10YR 6/2), fragments are gravel-sized Limestone 167.3-175.5' - yellowish gray, (5Y 7/2), medium grained, partially broken into disc-shaped fragments, voids (<1/16") over 10-25% of surface, with some small solution cavities (<5), HCL reaction is delayed	Possible drill induced breakage 172.0-173.0'
-	177.0		NR	-		No Recovery 175.5-177.0'	-



PROJECT NUMBER:	BORING NUMBER:					
338884 FI	I-07	SHEET	10	OF	16	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	6/07 START : 2/27/2007 END : 3	3/7/200	<ul><li>LOGGER : C. Sump, J. Burkard</li></ul>	
>00	<u>.</u>			DISCONTINUITIES	υ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - -				177.0-187.0' - NA		Limestone Fragments  177.0-180.0' - light olive gray, (5Y 5/2), fine to medium grained, moderate to strong HCl reaction, fragmented, voids (1/16") over 75% of surface, fossiliferous	
180 -137.6 - - - - - - - - - - - - - - - - - - -	R19-SN 10 ft 100%		NA			Limestone Fragments With  Disaggregated Limestone  180.0-185.3' - moderate yellowish brown, (10YR 5/4), large (up to 1" thick) limestone fragments, with silt and sand-sized disaggregated limestone, at 181.3-181.6' the limestone fragments are light olive gray (5YR 5/2), very fine grained, with moderate HCl reaction  Limestone  185.3-187.0' - light olive gray, (5Y 5/2), fine to medium grained,	
-147.6 	R20-SN 10 ft 94%	NA	NA	187.0-197.0' - NA		moderate to strong HCl reaction, fragmented, voids (1/16") over 10-40% of surface, fossiliferous Limestone Fragments 187.0-196.4' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine to medium grained, mild to moderate HCl reaction, fragmented (1/4"-1"), with disc-shaped fragments up to 3" thick, poorly fossiliferous, voids vary from 0-30% coverage	
195 -152.6 - - -	197.0		NR	-		- - - No Recovery 196.4-197.0'	



PROJECT NUMBER:

338884.FL

BORING NUMBER:

I-07

SHEET 11 OF 16

# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

CORING	I WIL I HOD AI	ND L	ZOIL IA	IENT: Rotosonic S/N SR-116, sonic, 6" outer casing and	4 60	ie bailei	ORIENTATION: Vertical
WATER	LEVELS: 4.4	11 bgs	on 3/6	6/07 START : 2/27/2007 END : 3/	7/200	LOGGER : C. Sump, J. Burkard	
				DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
	N, A, W	(9	FRACTURES PER FOOT	DESCRIPTION	익	MINERALOGY TEXTURE	SIZE AND DEPTH OF CASING,
H A A	# E E	(%) О	도한	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
	RNS	Ø	RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Σ	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ООШ	074	œ	正凸	THICKNESS, SON ACE STAINING, AND HOTTINESS	S		
					Н	Disaggregated Limestone	Possible drill induced
1 7				-	Ш	<ul> <li>197.0-198.2' - coarse grained, carbonate derived, few (&lt;10%)</li> </ul>	segregation of core – materials
1 -				197.0-207.0' - NA	П	gravel-sized limestone fragments	Illateriais
-				-	₽₩	– Limestone	Run drilled 2/28/07 -
				_		198.2-203.0' - yellowish gray to	_
					$\vdash$	dusky yellow, (5Y 7/2 to 5Y 6/1),	Infill material may have
200				-	H	<ul> <li>abundant voids, thin (1/16" thick)</li> <li>light olive gray (5Y 5/2) convoluted</li> </ul>	been lost during drilling - 198.2-200.0' (parting/
-157.6					ш	bedding lamination with variable	fracture surfaces do not
-				-	Н	<ul><li>spacing (1/16"-1/2"), horizontal</li></ul>	match) -
_				_		parting surfaces, also thin zones of	_
					Н	limestone fragments with little or no surface voids or fossils visible	
	R21-SN					- Sarrace volus of fossils visible	
	10 ft 100%	NA	NA	-	$\square$	-	Possible drill induced
1 -	100%			-	ᡛᡃᡰ	-	breakage -
1 -				-	Ш	Limestone Fragments	-
				_	H	Limestone Fragments  - 203.0-207.0' - yellowish gray, with	_
						light olive gray to medium gray	
				_	Н	inclusions, (5Y 7/2 with 5Y 5/2 to	1
1 005				-		N5), medium to coarse grained,  medicate to strong HCl regetion.	-
20 <u>5</u> -162.6					Н	moderate to strong HCl reaction, fragmented, void rich, fossiliferous,	
102.0				-	H	inclusions (1/2"-4") that are very	_
				_	ш	hard/dense with mild HCl reaction	_
					Ш	even when pulverized (may be breccia fragments)	
1 7	207.0				$\vdash$		]
1 †	201.0			-	╁┼	207.0-208.0' - yellowish gray, (5Y	Possible drill induced
-				-	Ш	<ul> <li>7/2), fine grained, fragmented into</li> </ul>	breakage -
				- 207.0-217.0' - NA	Н	1"-4" diameter angular to subangular fragments	-
				207.0-217.0 - NA -		- 208.0-215.4' - moderate yellowish	_
					Н	brown to light olive gray, (10YR 5/4	
						to 5Y 5/2), fine grained, medium	
210				<del>-</del>	Н	<ul> <li>strong (R3), fragmented (3/4"-2" diameter) with few pieces of full</li> </ul>	
-167.6				_		diameter core, highly fossiliferous	_
-				-	Ш	<ul> <li>(molds/casts), abundant voids, zone</li> </ul>	-
			l l	-	Ш	of less competent rock at 213.5', fine	_
			NA		П	grained fossil-poor zone at 211.5'	
1 7	R22-SN			_	$\vdash \vdash$		]
	10 ft 84%	NA		-	ш	<del>-</del>	-
1 -	0470			-	$\vdash$	-	-
1 -				-		<del> </del>	-
1 4				-	₽₩	<u>-</u>	_
				_	Ш	_	
1				_	$\vdash\vdash$		]
215				-	ш	-	
-172.6				_	Щ	<del></del>	_
				-	Ш	No Recovery 215.4-217.0'	-
1 4				-	口	-	_
			NR	-	H	_	
1 7	217.0			_	Ш		]



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	l I-07	SHEET	12	OF	16	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

### Processing Services of Ser	DESCRIPTION  DEPTH TYPE: ORIENTATION, ROUGHNESS, PLAMARTY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS  PLAMARTY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS, THICKNESS, SURFACE STAINING, AND TIGHTNESS, THICKNESS, SURFACE STAINING, AND TIGHTNESS, THICKNESS, SURFACE STAINING, AND TIGHTNESS, THICKNESS, SURFACE STAINING, AND TIGHTNESS, THICKNESS, SURFACE STAINING, AND TIGHTNESS, THICKNESS, SURFACE STAINING, AND TIGHTNESS, THICKNESS, SURFACE STAINING, AND TIGHTNESS, THICKNESS, SURFACE STAINING, AND TIGHTNESS, THICKNESS, THICKNESS, THE TIGHT THE TIGHT THICKNESS, THICKNESS, THE TIGHT THE TIGHT THE TIGHT THICKNESS, THE TIGHT	WATER LE	EVELS : 4.4	1 bgs	on 3/6	6/07 START : 2/27/2007 END	): 3/7/2007	LOGGER : C. Sump, J. Burkard	
Limestone Fragments   17.0-215.   17.0-2	Limestone Pragments 217.0-219.5 - yellowish gray, (5Y 7/2), fine grained, fragmented, thin gight olive gray (6Y 5/2) to medium gray (NS) Jamination, well defined bedding plane partings (smooth, planar, 1/2"-1" spacing) on many fragments, other fragments are typically angular to subangular 219.5-227.0 - 19.5-227.0 -	>00				DISCONTINUITIES	ى ق	LITHOLOGY	COMMENTS
227.0-237.0' - NA  217.0-227.0' - NA  217.0-227.0' - NA  217.0-237.0' - yellowish gray, (6Y gray) (5Y 5) to medium gray (NS isinged. fragmented, thin light olive gray (SY 5) to medium to gray (NS isinged. fragmented, thin light olive gray (SY 5) to medium to corse grained, fragmented, with increasing percentage of sand-size material for sand-size material for sand-size material fragmented, with increasing percentage of sand-size material fossiliterous (casts/molds). fragments include medium gray angular inclusions (1/2*-1") at 222.0-224 O; see grained, with light olive gray (SY 6Y) include medium gray angular inclusions (1/2*-1") at 222.0-224 O; see sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sand- and grave-discuted correct sa	227.0-237.0' - NA  217.0-227.0' - NA  217.0-227.0' - NA  217.0-227.0' - NA  217.0-227.0' - NA  227.0 fine grained, fragmented, thin light olive gray (57 52) to medium gray (NS) lamination, well defined bedding plane partings (smooth, planar, 1/2"-1" spacing) on many fragments, other fragments are typically angular to subangular 219.5-227.0' - medium to coarse grained, fragmented, with increasing percentage of sand-size material (carbonate derived, highly lossiliferous (casts/molds), fragments include medium gray angular include	DEPTH BELOV SURFACE AND ELEVATION (#	CORE RUN, LENGTH, AND RECOVERY (%	Ø	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LO	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
227.0-237.0' - yellowish gray, (6Y 8/1), fine grained, with light olive gray (5Y 6/1) lamination, fragmented to coarse sand- and gravel-sized irregular-shaped fragments (large [>1"] fragments make up 10-20% of volume), fragments exhibit strong bedding plane features (beds 1/2"-1" thick) at 230.0-232.0', some fragments exhibit dark gray surface coating that appear partially recrystallized (fine reflective crystal faces)  R24-SN 10 ft 100% NA NA 100	227.0-237.0' - yellowish gray, (5Y 8/1), fine grained, with light olive gray (5Y 6/1) lamination, fragmented to coarse sand- and gravel-sized irregular-shaped fragments (large [>1"] fragments make up 10-20% of volume), fragments exhibit strong bedding plane features (beds 1/2"-1" thick) at 230.0-232.0', some fragments exhibit dark gray surface coating that appear partially recrystallized (fine reflective crystal faces)	-177.6	10 ft		NA	217.0-227.0' - NA		217.0-219.5' - yellowish gray, (5Y 7/2), fine grained, fragmented, thin light olive gray (5Y 5/2) to medium gray (N5) lamination, well defined bedding plane partings (smooth, planar, 1/2"-1" spacing) on many fragments, other fragments are typically angular to subangular 219.5-227.0' - medium to coarse grained, fragmented, with increasing percentage of sand-size material (carbonate derived), highly fossiliferous (casts/molds), fragments include medium gray angular inclusions (1/2"-1") at 222.0-224.0' (possible limestone	
		230 -187.6	R24-SN 10 ft 100%		NA	227.0-237.0' - NA		- 8/1), fine grained, with light olive gray (5Y 6/1) lamination, fragmented to coarse sand- and gravel-sized irregular-shaped fragments (large [>1"] fragments make up 10-20% of volume), fragments exhibit strong bedding plane features (beds 1/2"-1" thick) at 230.0-232.0', some fragments exhibit dark gray surface coating that appear partially recrystallized (fine reflective crystal	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-07	SHEET	13	OF	16	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	6/07 START : 2/27/2007 END : 3/	7/2007	LOGGER : C. Sump, J. Burkard	
≥∩≘	_ (\$			DISCONTINUITIES	၂ ပွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
240 -197.6 - - - - - - 245 - - 202.6	R25-SN	NA	NA	237.0-247.0' - NA		Limestone Fragments  237.0-247.0' - Same as 227.0-237.0' except 6" of medium brown silt with gravel at 240.0', increasing percentage of sand-sized material with depth, limestone fragments are more friable and tend to decrease in size with depth	Possible drill induced "disaggregation"
250 -207.6 - - - - - - - - - - - - - - - - - - -	247.0 R26-SN 10 ft 100%		NA	247.0-257.0' - NA		247.0-257.0' - Same as 237.0-247.0' except limestone fragments vary from 30-70% over most of interval except sandy silt zone at 253.0-254.0'	Repeating upward fining sequences.



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-07	SHEET	14	OF	16	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	NATER LEVELS : 4.41 bgs on 3/6/07																
≥0 <i>€</i>	(%)			DISCONTINUITIES	LITHOLOGY	COMMENTS											
ELO ON (#	N, AND RY (9		ZES T	DESCRIPTION	CLC	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,										
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	, TYPE, ORIENTATION, ROUGHNESS, NARITY, INFILLING MATERIAL AND SOLUTION, AND TIGHTNESS に CHARACTERISTICS		FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.										
				_	$oxed{\Box}$	Limestone Fragments - 257.0-267.0' - Same as 247.0-257.0'	_										
_				257.0-267.0' - NA	Ш	except consisting of sand to gravel-size (1") limestone fragments,	=										
-	-			237.0-207.0 - INA	Ш	<ul> <li>with fragments decreasing and</li> </ul>	=										
-				-	Ш	becoming more friable with depth, few large fragments of more	=										
260				-	Ш	<ul> <li>competent fine grained limestone, silt zone is absent</li> </ul>	_										
-217 <u>.6</u> -					Н												
_				-	H	<u>-</u>	-										
-	R27-SN			-	H	_	-										
-	10 ft 100%	NA	NA	-	H	_	-										
_				-	Ħ	_	-										
					H	_											
-				-		_	-										
				-		_	-										
265_ -222.6					Ш		-										
_					Ш	-	=										
-					=	Ш	_										
-	267.0			_	-	Ш		Material appears drier than									
-				-	Ш	except with gravel-sized fragments     (1/4"-1-1/2") and sand-sized	similar zone at boring I-02 drilling with mud										
-														267.0-277.0' - NA	Ш	fragments of varying percentages.	Repeating upward fining
_											_	Н	few large (>3") limestone fragments at 267.0' and 269.5' that exhibit fine	sequences (3-4' thick)			
_							-	Ш	bedding laminations (1/8"-1/2") and bedding plane partings, medium	-							
270_ -227.6					Ш	brown silty zone at 275.0'	-										
-				-	Ш	_	-										
					H		_										
_	R28-SN 10 ft		NA	-	H	<u>-</u>	-										
-	100%			-	H	_	-										
-				-		<u></u>	=										
_						_	_										
-					Ш	-											
275 -232.6				_	Ш		_										
				-	団	_	-										
-				-	囯	_	-										
	277.0				Ш												



PROJECT NUMBER:

33884.FL BORING NUMBER:

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# **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 4.4	1 bgs	on 3/6	5/07 START : 2/27/2007 END : 3/	7/2007	LOGGER : C. Sump, J. Burkard	
				DISCONTINUITIES	U	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-280 -237.6 -	R29-SN 10 ft ' 64%	NA	NA	277.0-287.0' - NA		Disaggregated Limestone 277.0-283.4' - with gravel-size limestone fragments (20-40%)	4" core penetration slow (hard) upper 5-6 ft of run, very rapid in bottom 3 ft  6" casing driving very hard entire length of run  Lost core material may have been poorly graded sand sized material that fell out of core barrel or (less probably) a void from 284-287, based on difficulty of driving 6" casing
285 -242.6	287.0		NR	-		No Recovery 283.4-287.0'	- - - - - -
290 -247.6 -	R30-SN 10 ft /		NA NR	287.0-297.0' - NA		Disaggregated Limestone  287.0-290.0' - with gravel-size (1/4"-3/4") limestone fragments (10-15%), fragments are angular to subangular in shape, sand-sized material has strong HCl reaction, silty material has mild to moderate HCl reaction  Limestone  290.0-291.5' - light olive gray, (5Y 5/2), fossiliferous, small (1/16"-1/8") voids over (15-30%) of surface, few larger (<3/4") cavities, horizontal partings 1"-1-1/2" thick, fragments (2"-4"), few fragments are full core	Core from 287-291.5' recovered during 1st attempt coring 287.0-297.0' (45% recovery), bottom half of run assumed to have fallen out of core barrel 6" casing driven to 292' with difficulty, 4" core barrel retrieved and 6" casing advanced to 297 (causing slough to accumulate in hole)
295 -252.6	95% 297.0		NA			diameter No Recovery 291.5-292.0' Disaggregated Limestone With Limestone Fragments 292.0-297.0' - moderate HCI reaction, gravel-sized (1/2") limestone fragments 5-10%, HCL reaction is delayed	- - - - - - -



PROJECT NUMBER:	BORING NUMBER:		
338884.FI	l I-07	SHEET	16 OF 16

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723097.8 N, 458026.5 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER L	EVELS: 4.4	1 bgs	on 3/6	6/07 START : 2/27/2007 END : 3	7/200	7 LOGGER : C. Sump, J. Burkard	_
>00	(9)			DISCONTINUITIES	ڻ ن	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
300 -257.6	R31-SN 10 ft 1 100%		NA NA	297.0-307.0' - NA		Disaggregated Limestone With Limestone Fragments 297.0-297.8' - Same as 292.0-297.0' except limestone fragments are up to 3/4" diameter and make up 10% of	20 ft long 4" core barrel used to core to 307.0', bottom 10ft is representative of 297.0-307.0'; about 6 ft of additional material recovered represents a disturbed sample from 292-297' plus slough material from advancing the 6" casing from 292.0-297.0'  Core material at 292.0-297.0' is from 2nd attempt and is disturbed  Similar quartz crystals observed at depth >300.0' in boring I-02 Total depth of boring is 307.0'



PROJECT NUMBER:	BORING NUMBER:		
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# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLIN	DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel  ORIENTATION : Vertical							
WATER	LEVELS	: 3.5 ft bo	gs on 3/13	3/07	START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump			
>				STANDARD	SOIL DESCRIPTION COMMENTS			
A A N	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	O DEPTH OF CASING PRILLING PATE			
A BE		RECOVE	ERY (ft)		MOISTURE CONTENT, RELATIVE DENSITY OR  DEPTH OF CASING, DRILLING RATE,  DRILLING FLUID LOSS, TESTS, AND			
EN'S			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY			
42.5   PEPTH BELOW   10   2   2   2   2   2   2   2   2   2	6.0		ERY (ft)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  O DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND			
-								
20								



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-08	SHEET	2	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel

ORIENTATION : Vertical

WATER	LEVELS: 3.5	ft bgs	s on 3/	13/07 START : 3/13/2007	END: 3/1	5/20	007	LOGGER : L. Prochaska, C. Sum	р
>∩≎	_ @			DISCONTINUITIES		တ္	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNI PLANARITY, INFILLING MATERIAL AN THICKNESS, SURFACE STAINING, AND TIGHT	1D	SYMBOLIC LOG		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - - 15_ 27.5	R2-SNT 10 ft 100%	NA	NA	11.0-16.0' - NA				Fat Clay (CH) 11.0-11.3' - Same as 10.9-11.0  Silty Sand And Limestone (SM) 11.3-16.0' - very pale orange, (10YR 8/2), dry, strong HCI reaction, extremely fine to very fine sand-sized, very friable fragments up to 4" in diameter	NA = Not Applicable NR = No Recovery  R2: 9 minutes, 6' slough at top of core (discarded)
20 222.5	R3-SN 10 ft 100%	NA	NA	16.0-26.0' - NA	- - - - - - - - -			16.0-21.6' - Same as 11.3-16.0' except fragments up to 4" in diameter from 19.8-20.6', predominately gravel-sized fragments (<1/2"), voids (<1/16") covering 30-40% of surface, fossiliferous (molds and casts)  21.6-24.4' - Same as 11.3-16.0' except strong HCI reaction, 20-30%	Note: Installed 30' of 8" casing during run
	26.0			26.0-36.0' - NA	- - - - - - - - - -			sand-sized particles, 30% gravel-sized fragments (<2"), carbonate materials  24.4-26.0' - Same as 16.0-21.6' except grayish orange, (10YR 7/4)  Sandy Silt (ML)  26.0-31.8' - grayish orange, (10YR 7/4), very fine to fine grained, nonplastic, carbonate (similar to 24.4-26.0')	R3: 26 minutes
30 12.5	R4-SN				-			-	-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-08	SHEET	3	OF	14	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.5	ft bgs	s on 3/	/13/07 START : 3/13/2007	END : 3/1	5/20	07 LOGGER : L. Prochaska, C. Su	mp
≳o⊋	(%)			DISCONTINUITIES		90	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(%	FRACTURES PER FOOT	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
PTH RFA( EVAT	NGTE COVI	Q D (%)	ACTU R FO	DEPTH, TYPE, ORIENTATION, ROUGH PLANARITY, INFILLING MATERIAL A	AND	MBO	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
SU		œ		THICKNESS, SURFACE STAINING, AND TIC	GHTNESS	SΥ	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
_	10 ft 100%	NA	NA		_		_	_
-					-		Silt With Sand (ML)	-
-					-		31.8-32.3' - pale yellowish brown, mottled dusky yellowish brown,	-
-					-		- (10YR 6/2, 10YR 4/2), fine to medium grained, nonplastic, rapid	-
-							dilatancy, dusky yellowish brown material has no HCl reactivity; pale	-
					]		yellowish brown material is calcium	
35							carbonate, dusky yellowish brown is organics and moderate HCl reaction	
7.5					_		Silty Sand And Limestone Fragments (SM)	R4: 11 minutes
-	36.0			36.0-46.0' - NA	-		32.3-32.5' - Same as 24.4-26.0'	_
-					-		32.5-36.0' - Same as 24.4-26.0' except light gray, (N7), moist, strong	-
_					-		HCl reaction, friable fragments up to 4" in diameter comprised of very fine	-
							to fine sand-sized particles, carbonate materials	
_					_		Limestone Fragments	_
_					_		36.0-46.0' - pale yellowish brown, (10YR 6/2), moist, very fine to fine	_
-					-		grained, strong HCl reaction, very weak (R1), very friable; 36.0-36.8'	-
40 2.5							fragments up to 3-1/2" in diameter     and 2" in length of medium strong	Driller's Remark: Broke
-	R5-SN				-		(R3) rock, voids up to 3/16" covering approximately 20% of the surface, no	threads on 6" casing during - run
	10 ft 100%	NA	NA				fossils; 36.8-37.2': fracture zone	41.1-42.0' Possible
_					_		same as 36.0-36.8' except maximum 2" diameter; 37.2-37.5': fragment	carbonized organics
-					_		zone same as 36.8-37.2' except gravel fragments up to 1/2";	-
-					-		41.1-42.0": black (N1) mottling, organics	-
_					_		L Grigariios	-
_					-		Ţ	
45							_	<u></u>
-2.5 -					_		<u> </u>	R5: 11 minutes  End drilling 3/13/07
-	46.0			46.0-56.0' - NA	_		Disaggregated Weak Limestone	Resume drilling on 3/14/07
-				.5.5 55.5	-		With Limestone Fragments	- 1304110 41111119 011 0/14/07
-					_		46.0-56.0' - grayish orange, (10YR 7/4), <10% gravel (<1-1/2"), dark	-
					-		brown/black mottling and thin layer at irregular intervals (organics),	
					]		moderate reaction to HCl (slow to start, especially given fine grain	
_					-		size), gravel-sized limestone fragments of weak (R2) and friable	_
-					-		<ul> <li>material, carbonate derived with</li> </ul>	-
50 -7.5							possible trace silica fine sand-sized grains	_
-	R6-SN				_		-	-
					_	-		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-08	SHEET	4 (	)F	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.5	ft bgs	s on 3	/13/07 START : 3/13/2007 END : 3/	15/20	07 LOGGER : L. Prochaska, C. Sump			
≥∩≘	(9)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,		
H BE	E RU STH, SVEF,	(%) Q	FOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD		
	SORI	ROI	-RAC	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3×ME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.		
	10 ft	NA	NA						
-	100%			-	╁	-	Higher percentage of sand-		
-					Ħ	-	sized particles at top of run, possible segregation		
-					Ħ	-	during drilling or slough		
-						-	material -		
-				-	t	-	1		
_				-	₽	-	1		
55					$\mathbb{H}$		1		
-12.5				_	H		R6: 11 minutes		
] _	56.0				F	-	]		
-				56.0-66.0' - NA	口	Disaggregated Limestone With Limestone Fragments	]		
-					口	56.0-66.0' - similar to 46.0-56.0'	Drillaria Damaria Oliatria		
-					上	(carbonate derived) from 56.0-61.0', thin limestone beds (1" thick) with	Driller's Remark: Slightly more difficulty advancing		
-				-	Ь	light gray clayey silt interbeds (1/2"-1" thick) from 61.0-62.0', from	6" casing		
-				-	$\vdash$	<ul> <li>62.0-66.0 grayish orange (10YR 7/4)</li> </ul>	-		
-				-	+	sandy-silt with gravel-sized limestone fragments as described above from	-		
60				-	H	- 56.0-61.0', fragments angular to subangular and most (90%) are	-		
-17.5					Ħ	<3/4" diameter	_		
-	R7-SN				Ħ	-	1		
-	10 ft 100%	NA	NA		Ħ	_	1		
					片		]		
_				_	H	_			
_					片	<u>-</u>			
-					Ł	_	-		
-					₽	-	-		
						-	-		
-22.5				_	₽	_	R7: 15 minutes		
-	66.0			-	扛	-	-		
-	66.0			66.0-76.0' - NA	仜	_ Limestone	-		
-					口	- 66.0-69.5' - thinly bedded (3/4"-2") with silty sand material on parting	1		
-				-	巨	surfaces, highly fossiliferous (mold,	Silty sand interbeds		
_					$\perp$	<ul> <li>casts, brachiopods), numerous small voids (1/32"-1/8") over 40-50%</li> </ul>	washed out during drilling -		
] _					Ы	surface area, few voids/molds filled with black platy soft material	Continued repeating sequences of thin -		
] ]					F	(possible organics)	limestone beds with fine		
_					F	69.5-71.0' - thin beds with finer clayey soft interbed material (1/2"-1"	grained interbeds separated by silty sands		
70 <u> </u>				_	F	thick), limestone exhibits fine bedding laminations with dark	with limestone fragment zones 4.0-6.0' thick		
-27.5	R8-SN				#	<ul> <li>brown/black shining on parting</li> </ul>	201103 T.0-0.0 UIION		
-	NC-ON				$\vdash$	surfaces	-		



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	l I-08	SHEET	5	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.5	ft bgs	s on 3/	13/07 START : 3/13/2007 ENI	D: 3/15/20	07 LOGGER : L. Prochaska, C. Sun	пр
≥∩ ∷	(9			DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTN	Ĭ₩	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 75_ -32.5	10 ft 100%	NA	NA			Disaggregated Limestone 71.0-76.0' - with gravel-sized limestone fragments (all carbonate derived), becoming more coarse with depth to gravel-sized limestone fragments, 10% gravel-sized fragments >1" diameter (upward fining sequence)	R8: 24 minutes
- - - - - 80 - -37.5 -	R9-SN 10 ft 100%	NA	NA	76.0-86.0' - NA		Disaggregated Limestone With Limestone Fragments 76.0-83.9' - coarse sand-sized with bi-modal gravel-sized limestone fragments, fine gravel-sized fragments (1/4"-3/4") with few (<10%) 1"-2" fragments, all carbonate derived (moderate to strong reaction with HCI), silt dominated zones at 78.0-78.5' and 80.8-81.4', black tacky clayey layer approximately 3" thick at 81.2'	Driller's Remark: Difficulty driving 6" casing, tight, (80.0-81.0') medium coarse sand causing problems
-42.5 -42.5 42.5 	86.0 R10-SN			86.0-96.0' - NA		Limestone And Limestone Fragments 83.9-86.0' - medium strong (R3), 1"-3-1/2" fragments and full diameter for core fragments, yellowish gray, fossiliferous (molds>casts), small voids over 20% of surface 86.0-87.4' - Same as 83.9-86.0'  87.4-88.5' - coarse grained, sandy gravel-sized limestone fragments (1-3" diameter), increasing clay content Limestone 88.5-91.4' - 1"-4" thick with light gray (N7) clayey silt interbeds (1/2"-2" thick)	Fine interbed material possibly washed out during drilling R9: 18 minutes  Driller's Remark: Lost drilling fluid (bentonite mud) circulation



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.5	ft bgs	s on 3/	13/07 START : 3/13/2007 E	ND : 3/15/	2007	LOGGER : L. Prochaska, C. Sum	пр
≥0 00	(°)			DISCONTINUITIES		უ L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNES PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHT	SS,	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 95_ -52.5	10 ft 100%	NA	NA				Limestone Fragments 91.4-94.0' - yellowish gray, silty coarse sandy gravel-sized with 3"-5" silt zones with 1"-1-1/2" black, tacky clayey layers (organics) matrix  94.0-96.0' - pale yellowish brown to light olive gray, (10YR 6/2 to 5Y 5/2), 3"-4" in diameter, 2"-2-1/2" thick, fossiliferous, numerous small voids (1/32"-1/8") (approximately 30-40%	R10: 26 minutes
	96.0 R11-SN 10 ft 92%	NA	NA	96.0-106.0' - NA			of surface), grayish yellow (5Y 8/4) 4" thick silt with 1/2"-1" gravel sized limestone fragments at 96.0' Limestone And Limestone Fragments 96.0-98.7' - yellowish gray, variable small cavities (1/4"-3/4"), 2-3 linear worm boring type features (1/2" wide X 1-1/2"-2" long), 14" long core piece with high angle fracture running nearly entire length, limestone fragments are finer grained and contain no small voids/cavities  Disaggregated Limestone With Limestone Fragments 98.7-102.9' - moderate yellowish brown, (10 YR 5/4), fine grained, gravel-sized fragments varies from <5% small fragments (<1/2") to larger fragments (3/4"-1-1/2") comprising approximately 50% of material, larger limestone fragments >3" in diameter, fossiliferous (molds & casts), irregular zones of small voids (1/32"-1/8" diameter) and increased fossil density Limestone Fragments	- - - - - - - - - - - - - - - - - - -
105 -62.5 - - - - - - - - 110 -67.5 -	106.0 R12-SN		NR	106.0-116.0' - NA			102.9-105.2' - increasing clay - content, large fragments (>3") separated by finer <1-1/2" fragments with silt and sand, all carbonate derived No Recovery 105.2-106.0' Limestone 106.0-115.0' - with clayey silt with gravel-sized fragment interbeds (light gray N7), limestone beds, bedding plane partings range from 1"-4" in length with clayey interbeds ranging from <1/2" to >6", limestone yellowish gray (5Y 7/2) with small voids (1/16"-1/8") across 20-30% of the surface	R11: 25 minutes
					- 1	1		



PROJECT NUMBER:	BORING NUMBER:				
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.5	ft bgs	s on 3/	13/07 START : 3/13/2007 END : 3/	15/20	007 LOGGER : L. Prochaska, C. Sun	np
≥ ∩ ⊙	(9)			DISCONTINUITIES	ڻ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- 115 - 72.5	10 ft 100%	NA NA	NA	116.0-126.0' - NA		Disaggregated Limestone 115.0-116.0' - with gravel-sized limestone fragments as found in 106.0-115.0' (sharp contact)	R12: 16 minutes
	R13-SN 10 ft <sup>1</sup> 78%	NA	NA			Fragmented Limestone 116.0-123.8' - moderate yellowish brown, (10YR 5/4), moderate to strong HCI reaction, medium strong (R3), with coarse sandy fines and fine gravel-sized limestone in zones (1/4"-1"), large limestone fragments are fossiliferous with numerous small voids (1/32"-1/8") over 20-40% of the surface, large cavities (1/2") associated with large fossil molds, few worm borings (1/4" diameter, 1"-3" long). End of run: limestone fragment with fine grained angular clasts 1/4" thick, 1"-1-1/2" across (may be rip-up clasts) with mild reaction to HCl when scratched, clasts are hard and contain at least 10% silica (fine quartz grains visible in fracture corners), clasts are finely laminated with alternating light and dark layers (1/32"-1/8" thick)	Driller's Remark: 118.0- 120.0' & 121.0-123.0' possible voids based on penetration rate
- 125 -82.5 - - - - - -	126.0		NR	126.0-136.0' - NA		- No Recovery: 123.8-126.0'	R13: 29 minutes
130 <u> </u>	R14-SN		NA				-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-08	SHEET	8	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

COMING	INLINODA	ND L	ZUIFIV	IENT: Rotosonic S/N SR-116, sonic, 6" outer casing and	4 (	DIE Dallei	ORIENTATION : Vertical
WATER	LEVELS: 3.5	ft bg	s on 3/	13/07 START: 3/13/2007 END: 3/	1 <u>5/2</u> 0	07 LOGGER: L. Prochaska, C. Sum	ip
				DISCONTINUITIES	(2	LITHOLOGY	COMMENTS
N S S S S S S S S S S S S S S S S S S S	9€		<sub>o</sub>	DESCRIPTION	18	DOOK TYPE OOLOD	
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	(9)	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
ATI ATI	FES	(%) <sub>Q</sub>	[달[	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	32	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
무유	S S S S S S S S S S S S S S S S S S S	Ø	ZAC ER	PLANARITY, INFILLING MATERIAL AND	Ĭ₩	AND ROCK MASS	DROPS, TEST RESULTS, ETC.
БSБ		ď	ᇤᆲ	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	
	10 ft 93%	NA			ш	Limestone Fragments	Driller's Remark: Possible
	9376			-	Ħ	- 126.0-135.3' - alternating 1.0-2.0'	void at 131.0-133.0' based -
-				-	亡	intervals of large limestone fragments (>3") and coarse sandy	on 4" core penetration rate
_				-	₽	gravel-sized limestone fragments	_
					Н	(1/2"-2") with finely laminated	
1 7						(1/16"-1/6") argillaceous fragments	1
1 -				-	₩	- from 132.3-133.9', fragments exhibit	-
-				-		well defined bedding plane parting (smooth and planar) and react	-
1 _				_	<u></u>	- moderately to HCl when scratched	_
135					Н	(poorly when not), fine quartz grains	
-92.5				_	Ш	visible on fresh fracture faces and	R14: 18 minutes
-			NR	-	⊢	<ul> <li>corners (10-15% quartz) no fossils or voids, siliceous, well bedded, finely</li> </ul>	-
	136.0		$\vdash$	136 0 146 0' NA	ᡛ	laminated, calcareous, silty sandy	-
				136.0-146.0' - NA -		limestone material below	
					$\vdash$	No Recovery 135.3-136.0'	
1 7				_	Ľ	Limestone Fragments	1
-				-	╙	_ 136.0-144.6' - mild HCl reaction, medium strong (R3), limestone	-
_				-	H	fragments with coarse sand and	-
_				<u>-</u>		gravel-sized fragments of limestone	_
					Н	(1/4"-1"), larger limestone fragments	
				_		(>3" diameter), at 136.8 finely bedded limestone, 1/4" bedding	1
140				-	1	planes, smooth & planar, fine	1
140 <u> </u>					t	alternating light/dark laminations,	
-57.5			NA	-		quartz (silica) grains visible on	-
	R15-SN 10 ft	NA			Н	fracture edges (approximately 10%)	
	86%	INA					
1 7				-	╙	<del>-</del>	1
-				-		-	-
_				-	₽-	_	-
				_	₽+		_
1 7				-	$\vdash$	ſ	]
-				-	广	<u> </u>	-
-				-	╀	Н " <b>"</b>	-
145				_	仜	No Recovery 144.6-146.0'	D45: 07 minute
-102.5			NR	_	$\vdash$	_	R15: 37 minutes
1 7	146.0				Ľ		
1 1				146.0-156.0' - NA	Ш	Limestone	1
-				-	╁	146.0-146.3' - light olive gray, (5Y	-
1 -				-		5/2), fine grained, mild to moderate HCl reaction, fine silica grains, drusy	-
				_	╙	- calcite, fine, clear yellowish	
					$\Box$	recrystallized grains, poorly	
1 7				_	$\vdash$	fossiliferous, sharp contact with	Disaggregated due to
-				-	╁	underlying rock	drilling method -
-				-	仜	146.3-148.0' - yellowish grey, (5Y 7/2), strong HCl reaction,	-
1 4					┢	<ul> <li>fossiliferous, with small voids</li> </ul>	-
150_				-	片	(1/32"-1/8") over 10% of surface	
-107.5				_	$\vdash$		
1 -	R16-SN			·	t	†	1
					F		-
					1		
					Ĭ.		



PROJECT NUMBER:	BORING NUMBER:		
338884.FL	l I-08	SHEET	9 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS : 3.5	ft bgs	s on 3/	13/07 START : 3/13/2007 END : 3/	15/200	D7 LOGGER : L. Prochaska, C. Sum	р
<b>≩</b> Ω≨	(°)			DISCONTINUITIES	g	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 155 -112.5	10 ft 100%	NA	NA			Limestone Fragments  148.0-154.3' - yellowish gray, (5Y 7/2), fossiliferous with small voids (1/32"-1/8") over 10-20% of surface, few larger (1/2") cavities (fossil molds), 2"-4" horizontal partings with clayey silt and gravel-sized limestone fragment interbeds (1/2"-1-1/2" thick), interbed material exhibits low to moderate plasticity, thin zone (2"-3" thick) of friable limestone fragments and moderately graded sand-sized material, strong reaction to HCl and trace (<5%) silica grains is present at 148.6'	Disaggregated due to drilling method R16: 34 minutes
160 -117.5 - 165 -122.5 - - 170 -127.5	R17-SN 10 ft ' 94% 166.0	NA	NA NR NA	156.0-166.0' - NA		154.3-156.0' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, silty, sandy gravel-sized material (all carbonate derived), gravel-sized fragments friable 156.0-156.8' - yellowish gray, (5Y 7/2), fossiliferous, small voids (1/32"-1/8") over 10-20% surface, large cavities (up to 1/2" diameter and 1/2" deep), fragments subangular to subrounded in shape 156.8-158.0' - moderate yellowish brown to dark yellowish orange, (10YR 5/4 to 10YR 6/6), very friable, fine recrystallization, possible trace silica sand 158.0-163.0' - Same as 156.0-156.8' except strong HCl reaction, light gray clayey silt layer at 160.9' (low plasticity), moderate brown (5YR 3/4) poorly graded very fine sand/silt-sized material, possible trace silica sand (fine), fine clear particles (recrystallization) Limestone 163.0-165.4' - light olive gray, (5Y 5/2), strong (R4), dense, hard, few small voids (1/32"-1/8") <5% surface, horizontal partings (3/4"-5" spacing), generally planar, silty with gravel-sized limestone fragments, interbeds at 164.0' (2" thick) and 164.5' (light gray N7, dry), at 164.3' very dry, powdery silt-sized interbed material No Recovery 165.4-166.0'	Assume material not recovered was lost at end of run R17: 36 minutes
	1710-31				${}^{\dagger}$		



PROJECT NUMBER:	BORING NUMBER:					
338884.FI	I-08	SHEET	10	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.5	ft bgs	s on 3/	13/07 START: 3/13/2007 END: 3	15/20	D7 LOGGER : L. Prochaska, C. Sum	np
>00	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
175 -132.5 -132.5 -137.5 -137.5 -142.5 -142.5 -142.5	10 ft 78%  176.0  R19-SN 10 ft 100%	NA NA	NR SA	176.0-186.0' - NA  186.0-196.0' - NA		Limestone And Limestone  Fragments  166.0-173.8' - light olive gray, (5Y 5/2), with intervals of completely disaggregated limestone material, silty sand-sized with gravel-sized fragments (all carbonate derived) to silty-sandy gravel-sized limestone fragments, limestone at top of run has moderately developed bedding plane partings, limestone core (6") at 169.5' exhibits very fine bedding plane partings on top of core (finely laminated <1/32"), few small (1/2") cavities (sharp contact with above), bedding planes not visible over core length, amount of disaggregated sand-sized and smaller limestone fragments increasing with depth, slightly plastic clayey silt (light gray N7) at end of run  No Recovery 173.8-176.0'  Limestone Fragments  176.0-179.0' - light olive gray, (5Y 5/2), slow to moderate HCI reaction, subangular to angular, coarse sandy/gravel-sized carbonate disaggregated material (drilling induced), fragments are 2"-4" and larger in diameter, coarse sand and gravel-sized unconsolidated material is moderate yellowish brown (10YR 5/4), reacts strongly to HCI and is well rounded (gravel-sized <1")  Limestone  179.0-179.8' - dark yellowish orange to grayish orange, (10YR 6/6, 10YR 7/4), strong HCI reaction, small voids (1/32"-1/16") over 5-10% of surface, poorly fossiliferous with few molds (1/2"), fine recrystallization,  Limestone Fragments  179.8-181.7' - silty sandy gravel-sized material, carbonate derived, yellowish gray (5Y 7/2) fines  181.7-182.7' - moderate brown grading to pale yellowish brown, (5YR 4/4 to 10YR 6/2), moderate HCI reaction, very fine sand/salt with gravel-sized limestone fragments (<10%), trace silica sand  182.7-183.8' - Same as 179.0-179.8' Limestone And Limestone  Fragments  183.8-186.0' - strong HCI reaction, with clayey silt-sized material	R18: 16 minutes  Driller's Remark: possible void from 177.0-181.0' based on advancement of 4" core barrel, void not suggested based on 100% recovery  R19: 38 minutes



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-08	SHEET	11	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

00111110	METHODA	ND L	ZOII IV	IENT: Rotosonic S/N SR-116, sonic, 6" outer casing and	7 00	ic baller	ORIENTATION: Vertical
WATER	LEVELS: 3.5	ft bgs	s on 3	/13/07 START : 3/13/2007 END : 3/	15/200	)7 LOGGER : L. Prochaska, C. Sum	<u> </u>
				DISCONTINUITIES	CD	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	
H H	L'A	(o	FRACTURES PER FOOT	2200.111 11011	읙	MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
FAC	E R GTF OVE	(%) O	CTL FO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOI	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
E.E.	SOR	S O	RA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	Μ×	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
ПОП	10 ft	NΑ	NΑ		0)		
_	100%	INA	INA	_	Н	Limestone Fragments - 186.0-196.0' - alternating sequences	_
					ш	of fragmented limestone and	
				-	Н	fossiliferous limestone fragments,	7
-				-		- fragmented limestone exhibit fine	-
_				-	ш	laminations (1/32"-3/4") and planar bedding plane partings, silty sand	-
_					ш	- and gravel-sized limestone	_
					Ы	fragments at 192.5-193.0' and	
					Н	195.0-196.0', sharp contact between	
195				-	Ш	<ul> <li>fragmented finely laminated limestone and coarse fossiliferous</li> </ul>	=
-152.5				<del>-</del>	Н	limestone with large (1/2") fossil	R20: 25 minutes
_				-		casts/molds at 194.0'	-
_	196.0			400 0 000 01 1/2	$\vdash\vdash$	- 400 0 005 01	_
				196.0-206.0' - NA	Ш	196.0-205.0' - with coarse sand/fine gravel-sized material (<10%),	
I ]					$\vdash$	limestone fragments alternating	
				-	Ш	between fine grained finely bedded	
-				-	ш	- limestone (argillaceous) and	-
-				<u>-</u>	ш	fossiliferous massive limestone with small voids (1/32"-1/8") over 10-15%	-
_					$\vdash$	of surfaces, fine grained limestone	_
					Н	forms very angular fragments and	
						are typically <3" in size and are <3/4"	
200				-	Ы	<ul> <li>thick, fine grained limestone is light olive gray (5Y 5/2) with slow mild HCl</li> </ul>	=
-157.5						reaction, fossiliferous limestone is	
-	R21-SN		NA	-	Н	yellowish gray to grayish orange (5Y	-
_	10 ft	NA		-	ш	7/2 to 10YR 7/4) with moderate HCI reaction and is typically associated	_
I _	90%			_	Н	with coarse sand-sized material,	_
						coarse moderately graded	
					Ш	sand-sized material at top of run	_
_				-	ш	<ul> <li>(196.0-196.7'), possibly segregated during drilling</li> </ul>	-
-				-	Н	- daining drinning	-
_				-	H	_	_
_				_	ш	_	_
					Н		
205					$\Box$		7
-162.5				_	$\vdash \vdash$	No Recovery 205.0-206.0'	R21: 18 minutes
-			NR	-	ш	-	Finished drilling on 3/14/07
-	206.0			206 0-216 0' - ΝΔ	$\vdash$	Limestone Fragments	-
-				206.0-216.0' - NA -		Limestone Fragments - 206.0-216.0' - silty sandy	_
				_	$\mathbb{H}$	gravel-sized well graded limestone	
					Ш	fragments 1/2"-3" and larger in	Resume drilling on 3/15/07
_				-	$\mathbb{H}$	<ul> <li>diameter with fines grading to coarse sand and silt-sized (&lt;5%), fragments</li> </ul>	
-				-		are subangular, fossiliferous (more	-
-				-	₩	molds than casts), and exhibit small	-
_					ш	voids (1/32"-1/8") over 10-20% over the surface	_
_				_	H	uie suilace -	
210					Н		
-167.5				_	Ш	_	
-	R22-SN			-	$\vdash \vdash \vdash$	-	-
-					H	-	-
					1		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-08	SHEET	12	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 3.5	ft bgs	s on 3/	13/07 START : 3/13/2007 E	END : 3/15/	200	7 LOGGER : L. Prochaska, C. Sum	p
≥∩≘	- (ŷ			DISCONTINUITIES		<u>ي</u>	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNES PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHT	SS, S	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 215 -172.5	10 ft 100%	NA	NA					R22: 11 minutes
	R23-SN 10 ft 100%	NA	NA	216.0-226.0' - NA			Limestone Fragments  216.0-219.0' - yellowish brown, medium strong to strong (R3 to R4), gravel-sized limestone fragments, little to no finer material, thin zones of grayish orange fossiliferous limestone with small voids over 10-20% of surface  219.0-226.0' - well graded gravel-sized limestone fragments with coarse sand-sized material, 6" zones of large fragments (>3") at 222.0' and 223.5' may represent competent beds, fragmented by drilling method	- - - - - - - -
- 225 -182.5 	226.0 R24-SN			226.0-236.0' - NA			226.0-236.0' - well graded coarse sandy gravel-sized limestone fragments, mostly less than 1" with few exceptions, 20-30% of gravel-sized clasts are very friable and composed silt to sand-sized carbonate material	R23: 26 minutes
-						7		



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-08	SHEET	13	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

本で   8   50   DEPTH, TYPE, ORIENTATION, ROUGHNESS, EAVING HARDESS, CAVING R SMOOTHNESS, C	WATER	LEVELS: 3.5	ft bgs	s on 3/	/13/07 START : 3/13/2007 EN	ND: 3/15/2	2007	LOGGER : L. Prochaska, C. Sum	р
235 - 192.5 236.0 236.0 - 246.0' - NA 236.0-246.0' - NA 236.0-246.0' - Same as 236.0-236.0' except increasing percentage silt and yellowish brown (197k 5/4) silty 20165 246.0 - 256.0' - NA 246.0-256.0' - Same as 236.0-246.0' - Same as 236.0-246.0' except decreasing percentage of silt-stated material (similar to 226.0-256.0)' - Same as 236.0-246.0' - Same as 236.0-2	≥∩≘	_ (%			DISCONTINUITIES		L	LITHOLOGY	COMMENTS
235 -192.5 -192.5 -192.5 -192.5 -192.5 -192.5 -192.5 -192.5 -192.5 -246.0 -197.5 -246.0 -197.5 -246.0 -197.5 -246.0 -256.0 -256.	DEPTH BELOV SURFACE ANI ELEVATION (fl		Ø	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNES PLANARITY, INFILLING MATERIAL AND	SS, SAMBOLIC IO		MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
240 -197.5 R25-SN 10 ft NA 100% NA 100% NA 245 -202.5 246.0 246.0-256.0' - NA 246.0-256.0' - NA 246.0-256.0' - Same as 236.0-246.0' except decreasing percentage of silt-sized material (similar to 226.0-236.0'), increasing percentage of coarse, sand-sized material, all	- - - - 235 -192.5	100%	NA	NA	236.0-246.0' - NA			236.0-246.0' - Same as 226.0-236.0'	R24: 27 minutes
-202.5  246.0  246.0-256.0' - NA  246.0-256.0' - Same as 236.0-246.0' except decreasing percentage of silt-sized material (similar to 226.0-236.0'), increasing percentage of coarse, sand-sized material, all		10 ft		NA				fine sand-sized component, medium yellowish brown (10YR 5/4) silty	- - - - - - - - - -
250 -207.5	-202. <del>5</del>	246.0			246.0-256.0' - NA			except decreasing percentage of silt-sized material (similar to 226.0-236.0'), increasing percentage of coarse, sand-sized material, all	R25: 13 minutes
-207.5	-207.5	R26-SN					‡		_



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-08	SHEET	14	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723055.0 N, 458076.8 E (NAD83)

ELEVATION: 42.5 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

CONING	INICITIOD A	ND LC	VIII IV	IENT: Rotosonic S/N SR-116, sonic, 6" outer casing and	7 0	ore barrer	ORIENTATION: Vertical
WATER	LEVELS: 3.5	ft bgs	s on 3/	/13/07 START : 3/13/2007 END : 3/	15/20	07 LOGGER : L. Prochaska, C. Sum	р
				DISCONTINUITIES	ניו	LITHOLOGY	COMMENTS
NO (#)	. Q.S.		Ø	DESCRIPTION	<b>1</b> ŏ	ROCK TYPE, COLOR,	
HH H	S A A	(%	뿗		2	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND
TH VAT	RE F GTP XOVI	R Q D (%)	FS	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	1BO	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	g	FRACTURES PER FOOT	THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	10 ft	NA	NA		Ť		
_	100%			-	Ė	-	-
_					₽	_	-
					Д		_
					Н		
						[	_
_				-	十	-	-
-				-	ш	-	-
					t	<b> </b> -	-
255_ -212.5				_	F	<u> </u>	D26: 35 minutes
-212.3					Ľ	_	R26: 35 minutes
1 _	256.0				oxdapsilon	_	_
1				256.0-266.0' - NA	Ш	Limestone Fragments	
1 7					F	<ul> <li>256.0-266.0' - Same as 246.0-256.0'</li> <li>except increased percentage of large</li> </ul>	-
1 -					Ľ	limestone fragments (>3/4") from	-
-					╨	- 256.0-259.0' (approximately 50% by	-
-				-	仜	volume) 154.3-156.0' - moderate yellowish	-
_				-	╁	<ul><li>brown, (10YR 5/4), moderate to</li></ul>	-
-					Ľ	strong HCl reaction, silty, sandy	<u>-</u>
				_	H	gravel-sized material (all carbonate derived), gravel-sized fragments	_
260						friable	
-217.5				_	H	146.3-148.0' - yellowish grey, (5Y	
	R27-SN				F	<ul> <li>7/2), strong HCl reaction, fossiliferous, with small voids</li> </ul>	_
_	10 ft 100%	NA	NA	•	╁	(1/32"-1/8") over 10% of surface	-
-	100 /0				ш	-	-
-					世	-	-
_				-	$\vdash$	_	-
-					Ľ	-	-
				_	$\vdash$	<u> </u>	_
1					口		
1 7					$\vdash$		Boring at total planned
265						<b>[</b>	depth 3/15/07
-222.5				_	忙		R27: 29 minutes
-	0000				F	-	-
-	266.0				╆	Bottom of Boring at 266.0 ft bgs on	Water level on 3/20/07 is
-						- 3/15/2007	about 3' below ground - surface
					1		Install and grout 4" -
1					1		schedule 40 PVC casing in
1 7					1	[	boring
1 -					1	<u> </u>	Bottom of casing tagged at - 267.0'
-					1	-	-
-					1	-	-
-				_	1	_	_
-					1	-	-
					L		
1					1		



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-09	SHEET	1	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLING METHOD AND EQUIPMENT: Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel

ORIENTATION : Vertical

WATER	LEVELS	: 4.41 bg	s on 3/6/0	)7 5	START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska
300				STANDARD	SOIL DESCRIPTION g COMMENTS
N A D S	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	
A SE		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
<u> 42.4</u>	0.0			(N)	Sandy Organic Topsoil (3.14) Water level above ground surface due to
-	0.0				■ 0.0-1.0' - dark brown
-					Poorly Graded Sand (SP)  "Water level is based on Ground Water Monitoring at LNP site (FSAR Table
-					1.0-4.0' - grayish yellow, (5Y 5/4), fine grained, no HCl 2.4.12.08)"
-					reaction, silica sand
-					<b>-</b>
-		6.0	R1-SN		<b>-</b>
-					<b>-</b>
-					4.0-6.0' - Same as 1.0-4.0' except yellowish gray, (5Y
					8/1)
5 37.4					Coring run times not recorded for I-09
-	0.0				<b>-</b>  ∴
1 -	6.0				6.0-16.0' - Same as 1.0-4.0' except yellowish gray,
1 -					(5Y 8/2 to 5Y 8/1), very poorly graded, yellowish gray from 6.0-10.0' becoming lighter shade of yellowish
-					gray from 10.0-16.0'
-					
-					<b> </b>
-					<b> </b>
-					
10					
32.4					
-					<b>1</b> /4
_		10.0	R2-SN		
-					<b>1</b>
-					<b>1</b>
-					<b>1</b>
-					<b>1</b> :4
-					<b>1</b>
-					<b>1</b>
15					<b> </b>
27.4					7.4
	16.0				1:1
1 -					16.0-20.4' - Same as 4.0-6.0' except very poorly
1 -					graded
1 -					1 1
1 -					101
1 -					1:1
1 -					1.1
1 -					1:1
20					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-09	SHEET	2	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLING METHOD AND EQUIPMENT: Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel

ORIENTATION: Vertical

WATER	LEVELS	: 4.41 bg	s on 3/6/0	)7 5	START : 3/11/2007 END : 3/12/2007 L	LOGGER	: C.	Sump, L. Prochaska
>				STANDARD	SOIL DESCRIPTION		၅	COMMENTS
N (#	SAMPLE	INTERVA		STANDARD PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
TH BI		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OF	₹	BOL	DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOG	ΣY	SYN	INSTRUMENTATION
22.4								
		10.0	R3-SN		Poorly Graded Sand (SP) 20.4-26.0' - pale yellowish brown to pale brown, (10YR 6/2 to 5YR 5/2), silica sand	]		
l _		10.0	110-011		(10YR 6/2 to 5YŔ 5/2), silica sand			
_						_		_
_						-		_
_						_		-
_						-		-
-						-		-
25						-		-
17.4								<del>-</del>
_	26.0							
					26.0-31.5' - Same as 20.0-26.0' except mottled duyellowish brown, (10YR 2/2), moist, fine grained	usky		
_					yellowon brown, (10111 2/2), molot, line grained	_		_
-						-		-
-						-		-
_						-		-
-						-		-
30						-		-
12.4								_
		5.5	R4-SN					
		5.5	K4-5IN					
_					No Recovery 31.5-36.0'	_		_
-						-		=
-						-		-
-						-		-
-						-		-
35						-		-
7.4								
_					Begin Rock Coring at 36.0 ft bgs See the next sheet for the rock core log	_		_
_						-		_
-						-		_
-						-		-
-						-		-
-						-		-
40						-		-
70_								



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-09	SHEET	3	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	6/07 START: 3/11/2007 END: 3	/12/	<u> 200</u>	7 LOGGER : C. Sump, L. Prochask	a
≥∩≘	_			DISCONTINUITIES	]	<u>ي</u>	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS		SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R5-SN 10 ft 100%	NA	NA	36.0-46.0' - NA			Sand (SP)  36.0-37.7' - Same as 26.0-31.5' except pale yellowish brown to dusky yellowish brown, (10YR 6/2 to 10YR 2/2), mottled  Silt (ML) 37.7-38.9' - dark yellowish brown to dusky yellowish brown, (10YR 4/2 to 10YR 2/2), moist, <10% sand, nonplastic, rapid dilatancy, no HCl reaction, siliceous, heavily mottled  Limestone 38.9-46.0' - yellowish gray, (5Y 7/2), dry, very fine to fine grained, strong HCl reaction, extremely weak (R0), unconsolidated and very fine grained from 41.7-41.9'	NA = Not Applicable NR = No Recovery
	R6-SN 10 ft 100%	NA	NA	46.0-56.0' - NA	-		Silty Sand (SM)  46.0-47.1' - brownish gray, (5YR 4/1), wet, fine to coarse grained, very poorly graded, gravel-size fragments up to 2", fine grained silica and carbonate sand mixture (20-30%)  Silt (ML)  47.1-51.0' - pale yellowish brown, (10YR 6/2), moist, nonplastic, slow dilatancy, strong HCl reaction, <10% poorly graded sand, all carbonate  Silt With Sand (ML)  51.0-52.5' - pale yellowish brown, (10YR 6/2), wet, nonplastic, rapid dilatancy, moderate HCl reaction, 10-20% medium grained sand, all carbonate  52.5-56.0' - Same as 51.0-52.5' except moist, strong HCl reaction, very fine to medium grained sand, gravel-sized calcareous rock fragments up to 3" in diameter	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-09	SHEET	4 0	F	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel

ORIENTATION : Vertical

WATER LEVELS	: 4.4	1 bgs	on 3/6	6/07 START: 3/11/2007 END: 3/	12/20	07 LOGGER : C. Sump, L. Prochask	а
≥∩ ⊕   - @				DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft) CORE RUN, LENGTH, AND BECONCEDY (%)	RECOVERT (3	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
10	'-SN 0 ft 10%	NA	NA	56.0-66.0' - NA		Limestone  56.0-56.3' - dark yellowish brown, (10YR 4/2), moderate HCl reaction, weak to medium strong (R2 to R3), fragments up to 3" in diameter Disaggregated Limestone 56.3-57.9' - dark yellowish brown, (10YR 4/2), strong HCl reaction, staining, organics, moderate dilatancy, carbonate 57.9-65.6' - dark yellowish brown, (10YR 4/2), strong HCl reaction, 20-30% poorly graded sand-sized, all carbonate	
10	3-SN 0 ft 100%	NA	NA	66.0-76.0' - NA		Limestone 65.6-66.0' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, extremely weak (R0), clay interbeds up to 1" Disaggregated Limestone 66.0-66.5' - dark yellowish brown, (10YR 4/2), moderate HCl reaction, 10-20% poorly graded fine to medium grain sand, calcareous Limestone 66.5-67.5' - Same as 56.0-56.3' except fragments up to 4" in diameter Disaggregated Limestone 67.5-69.5' - Same as 56.3-57.9' Limestone 69.5-76.0' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), very fine to fine grained, strong HCl reaction, gravel-sized rock fragments up to 5-1/2"	_



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-09	SHEET	5	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	11 bgs	on 3/6	S/07 START : 3/11/2007 END : 3/	12/20	07 LOGGER : C. Sump, L. Prochas	ка
≳ D ⊋	(%)			DISCONTINUITIES	၂ ဗွ	LITHOLOGY	COMMENTS
N AN AN	N, AND RY (9		ZES IT	DESCRIPTION	O LC	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R9-SN 10 ft 100%	NA	NA	76.0-86.0' - NA		Disaggregated Limestone 76.0-76.8' - Same as 66.0-66.5' except limestone fragments up to 1" in diameter 76.8-79.0' - Same as 56.3-57.9'  79.0-83.2' - Same as 66.0-66.5' except few extremely weak (R0) limestone fragments, up to 4" in diameter  83.2-86.0' - Same as 66.0-66.5' except dry, one fragment (up to 1") with organic staining, few limestone fragments (up to 2" diameter)	- - - - - - - - - - - - - - - - - - -
8542.6	86.0 R10-SN 10 ft 100%		NA	86.0-96.0' - NA		86.0-87.5' - Same as 66.0-65.5' except 20-40% poorly graded sand-sized calcareous particles, limestone fragments up to 1" diameter, 1" lens of staining dark yellowish brown (10YR 4/2) Limestone 87.5-88.0' - subangular rock fragments 2"-4" in diameter 88.0-88.4' - yellowish gray, (5Y 8/1), weak (R2), fossiliferous (molds/casts), small voids/cavities (<1/2") due to fossil molds, 1"-2" thick irregular horizontal partings, rough to undulating bedding planes, little to no infilling or staining  Disaggregated Limestone 88.4-90.7' - gravel-sized limestone fragments, >50%, ranging in size from 1/4"-1" Limestone With Clayey Silt 90.7-94.0' - grayish yellow to yellowish brown, voids (1/16"-1/8") across 15-20% of surface and concentrated in irregular zones, small black inclusions (1/16"-1/8"), horizontal partings/beds, 1"-4" in thickness with light gray to medium gray (N7 to N5) gravel-sized clayey silt fragments, interbeds (1"-2" thick)	Driller's Remark: Loss of circulation



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-09	SHEET	6	OF	14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DEPTH BELOW SURFACE AND ELEVATION (ft)	UN, I, AND ERY (%)			DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
TH BELOV RFACE ANI VATION (fi	UN, I, AND ERY (%)						
SUR	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
100 -57.6 -	R11-SN 10 ft 100%		NA	96.0-106.0' - NA		Disaggregated Limestone  94.0-96.0' - Same as 86.0-87.5' except 10% fewer gravel-sized limestone clasts  96.0-97.6' - Same as 66.0-66.5' except 20-40% poorly graded sand-sized calcareous grains, 20% gravel-sized limestone clasts from 3/16"-3"  Limestone  97.6-98.4' - Same as 69.5-76.0' except subangular rock fragments up to 3" in diameter  Disaggregated Limestone 98.4-99.3' - Same as 56.3-57.9' 99.3-100.0' - Same as 66.0-66.5' except 10% gravel-size calcareous fragments up to 1/2" in diameter  Limestone With Clayey Silt  100.0-102.8' - Same as 90.7-94.0' except no black inclusions  Disaggregated Limestone 102.8-103.5' - Same as 99.3-100.0' 103.5-104.5' - Same as 99.3-100.0' Limestone With Clayey Silt  Limestone With Clayey Silt  104.5-106.0' - Same as 90.7-94.0' except no black inclusions	- - - - - - - - - - - - - - - - - - -
110 -67.6	R12-SN 10 ft 87%		NA NR	106.0-116.0' - NA		Limestone  106.0-108.0' - Same as 87.5-87.8' except with some silt 20-30%, up to 3" in diameter  Disaggregated Limestone  108.0-108.6' - Same as 99.3-100.0' except 30-50% gravel-sized rock fragments up to 1-1/2"  Limestone With Clay And Silt  108.6-114.7' - Same as 90.7-94.0' except no black inclusions and sandy silt (ML-SP) beds, same as 99.3-100' from 101.3-101.5' and 102.3-103.0'  No Recovery 114.7-116.0'	- - - - - - - - - - - - - - - - - - -
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-09	SHEET	7	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER LEVELS: 4.41 bgs on 3/6/07			on 3/6	5/07 START: 3/11/2007 END: 3	/12/200	/2007 LOGGER: C. Sump, L. Prochaska			
>0≅	(9)			DISCONTINUITIES	၂ ပွ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
- - - - - 120_			NA	116.0-126.0' - NA		Disaggregated Limestone 116.0-117.0' - dark yellowish brown, (10YR 4/2), coarse grained, calcareous Limestone With Clay And Silt 117.0-120.0' - Same as 108.6-114.7' except fine to medium grained, moderate HCI reaction, pale yellowish brown (10YR 6/2) sandy silt (ML-SP) from 119.0-119.3', 10-20% limestone fragments up to 1" in diameter	- - - - -		
-77.6 - - - - - - - - - - - - - - - - - - -	R13-SN 10 ft 40%		NR	-		No Recovery 120.0-126.0'	- - - - - - -		
- - - - - - - - - - - - - - - - - - -	R14-SN 10 ft 95%		NA	126.0-136.0' - NA		Limestone  126.0-126.5' - grayish orange, (10YR 7/4), moderate HCl reaction, fossiliferous (molds/casts), voids (1/16"-1/8") over 25-30% of surface, cavities (up to 1/2"), associated with fossil molds  126.5-130.5' - 80% angular to subangular limestone fragments >2" in diameter, few pieces up to 4", highly fragmented portion comprised of fine grained limestone with few fossils or voids, little fine material (silt/clay), thin medium brown coatings  Disaggregated Limestone  130.5-135.5' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, gravel-sized fragments of limestone in silty sand-sized matrix, <10% siliceous sand, 15% gravel-sized fragments typically <1" in thin (<1") zones, thin dark brown horizontal layers			
-92. <del>6</del>	136.0		NR	-	H	No Recovery 135.5-136.0'	-		
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PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-09	SHEET	8	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	S/07 START : 3/11/2007 END : 3/	12/20	07 LOGGER : C. Sump, L. Prochasl	ra .
\$ D €	(%)			DISCONTINUITIES	၂ ၅	LITHOLOGY	COMMENTS
ELO E ANI	AND 3₹ (%	_	ZES T	DESCRIPTION	O'C	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R15-SN 10 ft 100%		NA	136.0-146.0' - NA		Disaggregated Limestone  136.0-140.5' - coarse grained, 30% angular to subangular limestone fragments ranging in size between (1/4"-1") and 50% ranging in size from 2"-4" in diameter  140.5-142.1' - Same as 136.0-140.5' except increasing percentage of silt- and sand-sized material  142.1-145.5' - mild to strong HCI reaction, increasing silt/clay content, limestone fragments up to 2"-4" in diameter on 2"-4" spacing with light gray (N7) silty, clayey, and gravelly interbeds, few voids or fossils	-
-	146.0			146.0-156.0' - NA		145.5-146.0' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), strong HCI reaction, sharp contact, mottled appearance, 5-10% very fine grained silica sand Interbedded Limestone 146.0-148.5' - yellowish gray to grayish orange, (5Y 7/2 to 10YR 7/4),	
-150 -107.6 -107.6 - - - - -	R16-SN 10 ft 100%		NA			graysh or large, (27 The to The Than), with silt and clay, interbeds with gravel-sized limestone fragments, voids 1/16"-1/8" over <20% surface, few fossils (mold/casts), core and fragment thickness range from 1-1/2"-5" with light gray (N7) clayey silt with gravel interbeds 2"-4" thick  Disaggregated Limestone 148.5-150.5' - moderate yellowish brown and dark yellowish brown, (10YR 5/4 and 10YR 4/2), very fine silty sand-sized  Disaggregated Interbedded Limestone 150.5-155.3' - moderate yellowish brown, (10YR 5/4), with thin beds of	- - - - - - - - -
- 155 -112.6	156.0			- - -		gravel-sized limestone fragments, 6" limestone bed at 152.0-152.6', large limestone fragments every 6"-8" with clayey gravel (<2")  Disaggregated Limestone 155.3-156.0' - Same as 148.5-150.5'	-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-09	SHEET	9	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER LEV	VELS: 4.4	1 bgs	on 3/6	6/07 START : 3/11/2007 END : 3/	12/200	DOT LOGGER : C. Sump, L. Prochask	a
≥00	_ ;;			DISCONTINUITIES	ي [	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
160 -117.6 - - - - - - - - - - - - - - - - - - -	R17-SN 10 ft 100%	NA	NA	156.0-166.0' - NA		Disaggregated Interbedded Limestone  156.0-157.5' - Same as described above except 2" silty, very fine, dark yellowish brown to dusky yellowish brown (10YR 4/2 to 10YR 2/2) sand-sized layer at 157.0' (similar to previously described), trace silica (quartz) grains; appears to be part of repeating sequence of gravel-sized fragments with few full core diameter limestone pieces with dark yellowish brown silty to very fine sandy layers on 25.0' spacing Limestone  157.5-158.5' - yellowish gray, (5Y 8/2), fine grained, mild to moderate HCI reaction, weak (R2), few fossils or voids  Disaggregated Interbedded Limestone  158.5-162.0' - limestone fragments less than 2", increasing silt and clay-sized content with depth  Disaggregated Limestone 162.0-162.4' - dark yellowish brown, (10YR 4/2), poorly graded  Disaggregated Interbedded Limestone	
-170 -127.6 	R18-SN 10 ft 100%	NA	NA	166.0-176.0' - NA		Limestone  166.0-169.9' - yellowish gray, (5Y 8/1), fine grained, weak (R2), limestone fragments (>2"), 1-3" core lengths, very thin clayey silt (<1/16") on parting surfaces, fine alternating light and dark laminae at 166.0-166.3', very fine iridescent grains (pyrite) on fresh surface, trace fine grained silica  Disaggregated Interbedded Limestone 169.9-171.3' - light gray, (N7), with large (>3") fragments separated by silty to clayey gravel (<1-1/2" pieces), suggestive of interbeds 171.3-174.5' - with large limestone fragments (3"-4")	



PROJECT NUMBER:	BORING NUMBER:		
338884.FI	I-09	SHEET	10 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER LEVELS: 4.41 bgs on 3/6/07			on 3/6	6/07 START : 3/11/2007 END :	3/12/200	/12/2007 LOGGER : C. Sump, L. Prochaska			
>00	(9			DISCONTINUITIES	υ	LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
	R19-SN 10 ft 100%		NA	176.0-186.0' - NA		Disaggregated Limestone  174.5-176.0' - moderate yellowish brown to yellowish gray, (10YR 5/4 to 5Y 8/1), very fine with few fine gravel-sized fragments (<5%), with darker brown mottled layer at 174.9' Limestone Fragments  176.0-178.3' - fine to coarse grained limestone fragments, trace fine silica sand, subangular with 20% subrounded fragments 1"-2" in diameter Limestone  178.3-183.6' - fractured limestone fragments 2"-4" with very few fines, highly fossiliferous fragments containing numerous molds (and few casts) 1/4"-1/2" in diameter  Limestone  183.6-186.0' - limestone fragments, similar to 176.0-178.3', 50% limestone fragments (>2") exhibit bedding plane partings or fractures 3/4"-1" thick			
-190 -147.6 - - 195 -152.6	R20-SN 10 ft 100%		NA	186.0-196.0' - NA		Disaggregated Interbedded Limestone 186.0-196.0' - limestone fragments (1"-4" in diameter) with coarse sand to fine gravel-sized (1/4"-3/4") limestone fragments, 3.0' zones of large fragments (>2") with 1-2' thick zones of smaller limestone fragments (1/2"-1-1/25") and increased percentage of coarse sand to fine gravel-sized fragments			
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER LEVELS: 4.41 bgs on 3/6/07			on 3/6	6/07 START: 3/11/2007 END: 3	/12/200	12/2007 LOGGER: C. Sump, L. Prochaska			
200	(9)			DISCONTINUITIES		LITHOLOGY	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.		
	R21-SN 10 ft 100%		NA	196.0-206.0' - NA		Disaggregated Interbedded Limestone  196.0-206.0' - Same as 186.0-196.0' except repeating sequences of large limestone fragments separated by zones of coarse sand and finer gravel-sized limestone fragments, some bedding plane fractures (1/4"-1/2" thick), angular fragments			
210 -167.6 - - 215 -172.6	206.0 R22-SN 10 ft 100%		NA	206.0-216.0' - NA		Limestone Fragments  206.0-209.5' - coarse grained, all carbonate derived, more coarse with depth to poorly graded gravel-sized limestone fragments <1/2", angular  209.5-216.0' - angular to subangular limestone fragments more coarse with depth, from 211.0-216.0' fragments are 2"-5" in diameter, 4" diameter pieces from 213.2-214.2', 1"-2" thick limestone beds with silty sand interbeds (<1/2" thick)			
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PROJECT NUMBER:	BORING NUMBER:					
338884.FI	I-09	SHEET	12	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	11 bgs	on 3/6	6/07 START: 3/11/2007 END:	3/12/200	7 LOGGER : C. Sump, L. Prochask	a .
>00	<u>.</u>			DISCONTINUITIES	ڻ ا	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 220 -177.6 - - - - - - - - - - -	R23-SN 10 ft 100%		NA	216.0-226.0' - NA		Disaggregated Interbedded Limestone 216.0-226.0' - alternating 1.0-2.0' thick zones of coarse sandy gravel-sized limestone fragments and large (>3") limestone fragments, finer gravel-sized fragments (<3/4") are angular and some exhibit bedding plane fractures (smooth, planar), larger fragments are mostly irregular subangular in shape with undulating fracture surfaces	
230 -187.6 - - - - - - - 235 -192.6	226.0 R24-SN 10 ft 100%		NA	226.0-236.0' - NA		Limestone Fragments  226.0-231.0' - coarse sandy gravel-sized (<1/2") limestone fragments at top, more coarse to large (>3") limestone fragments at 231.0', fragments are angular to subangular, fragments <1-1/2" exhibit bedding plane fracture surfaces (smooth and planar) 1/4"-3/4" in thickness, fragments >2" are irregular  231.0-235.7' - coarse grained, less than 10% subangular to subrounded fragments 2" or greater	
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PROJECT NUMBER:	BORING NUMBER:					
338884.FI	l <sub>I-09</sub>	SHEET	13	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 4.4	1 bgs	on 3/6	5/07 START : 3/11/2007 END : 3/	12/200	D7 LOGGER: C. Sump, L. Prochask	a
200				DISCONTINUITIES	٥	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R25-SN 10 ft 90%	NA	NA	236.0-246.0' - NA		Disaggregated Limestone  235.7-236.0' - moderate yellowish brown, (10YR 5/4), <10% gravel Limestone Fragments  236.0-245.0' - similar to 231.0-235.7' except yellowish gray (5Y 8/1) silt (with gravel) <10%, <1/2" in diameter at 237.3-238.0'	- - - - - - - - - - - - - - - - - - -
-202.6			NR			No Recovery 245.0-246.0'	
250 -207.6	246.0 R26-SN 10 ft 85%		NA	246.0-256.0' - NA		Limestone Fragments  246.0-254.5' - Same as 236.0-245.0' except limestone fragments	Extreme difficulty advancing 6" casing. Casing advanced to 250.0' then 4" casing and core retracted. Finished driving 6" and then cleared out the hole prior to coring to 266.0'.
255_ -212.6 -	256.0		NR	<u>-</u> -		No Recovery 254.5-256.0'	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-09	SHEET	14	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1722958.6 N, 457888.4 E (NAD83)

ELEVATION: 42.4 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

				in 1. Notosonic 5/14 5/1-110, sonic, o outer casing and			ORIENTATION: Vertical
WATER	LEVELS: 4.4	1 bgs	on 3/6		12/20	LOGGER: C. Sump, L. Prochas	
				DISCONTINUITIES	(D	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		S	DESCRIPTION	SYMBOLIC LOG	DOOK TYPE COLOR	
SE NO	N. A. Y.		ᆱᆫ	BEGGIAII HON	2.	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
AAH		(%) 🛭	ΪŽΫ	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
무류의		Ø	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND	ME	AND ROCK MASS	DROPS, TEST RESULTS, ETC.
SE	222	ď	H H	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	
				256.0-266.0' - NA		Limestone Fragments 256.0-266.0' - Same as 246.0-254.5'	6" casing advanced to
-				-	1	256.0-266.0' - Same as 246.0-254.5'	256.0' after retrieving 4" -
_				-	1		core sample (246.0-
				_			256.0'). Driller cleaned borehole and advanced 4" -
							case from 256.0-266.0'.
_				-	1		Sample fell out during
-				-	ł		retrieval. Used 20.0' core -
_				-	4		barrel with flapper bit to
				_			retrieve disturbed material.  Bottom 10.0' logged as
260							material from 256.0-266.0'.
-217.6				<del></del>	1		-
-	R27-SN			-	1		-
-	10 ft	NA	NA	-	4		1
	100%		"				
					1		1
_				-	1		1
-				-	┨		-
_				-	1		-
				_			_
_				-	1		1
				-	1		-
265 -222.6					1		
				-			-
	266.0				1		
						Bottom of Boring at 266.0 ft bgs on	
				_	1	3/12/2007	1
_				-	1		1
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PROJECT NUMBER:	BORING NUMBER:					
338884 FI	I-10	SHEET	1	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS	: 1.0 ft b	gs on 03/2	25/07	START : 3/25/2007 END : 3/26/2007 LOGGE	₹ : J.	Burkard
				STANDARD	SOIL DESCRIPTION	ß	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME TIGOGO CLOST STATES COST CO	SYMBOLIC LOG	DEDTILOF CACINO SOULUIS SATE
4 BE ACE ATIOI		RECOVI	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	iOLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
EPT! URF,			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	ΥMΒ	INSTRUMENTATION
<u> 42.0</u>	0.0			(N)	Poorly Graded Sand (SP)	0)	
	0.0				0.0-5.0' - grayish brown to moderate yellowish brown,	┨	Water level is 1.0' below ground surface
-					(5Y 3/2 to 10YR 5/4), moist, fine grained, no HCI reaction, silica sand, one very pale orange (10YR	-	
-					8/2), round limestone fragment 3" diameter at 4.6' with	┨	-
-					strong HCI reaction	┨	-
-						-	
-		5.0	R1-SN			-	Core run times not recorded for I-10
-						┨	-
-						┨	-
5						1	-
37.0					No Recovery 5.0-6.0'	1	-
-	6.0					1	] 1
-					Poorly Graded Sand (SP)	1	1
-					6.0-11.0' - moderate yellowish brown to very pale orange, (10YR 5/4 to 10YR 8/2), moist, fine grained,	1	1
					strong HCl reaction, silica sand, with carbonate fines in orange material near bottom of interval	]	]
					in orange material near bottom of interval	]	
_							_
_							_
10					<u> </u>		
32.0							]
_		9.0	R2-SN		Limestone Fragments	1	-
-					11.0-13.0' - moderate yellowish brown transitioning to	Ħ	-
-					yellowish gray, (10YR 5/4 to 5Y 7/2), strong HCl reaction, very fine grained to microcrystalline,	Ë	-
-					contains numerous voids surfaces, colors vary	世	-
-					depending on voids, visible calcite crystals with visible cleavage planes	╀	-
-					13.0-14.4' - yellowish gray, (5Y 7/2), mild HCl reaction, voids (<1/16") on 20-40% of surface	F	-
-					16action, voius (< 1/10 ) on 20-40% of surface	口	-
15					Silt (ML)	1	1
27.0					14.4-15.0' - very pale orange, (10YR 8/2), strong HCI reaction, carbonate material	<b>1</b>	-
-	16.0				No Recovery 15.0-16.0'	1	1
-					Silt (ML)	<b>1</b>	1
-					16.0-16.5' - very pale orange, (10YR 8/2), strong HCl reaction, carbonate material	Ш	1
					Limestone Fragments	口	1
					16.5-19.6' - very pale orange, (10YR 8/2), strong HCl reaction, limestone fragments up to 4" in diameter	Ъ	]
					with sections of pulverized rock less than 1" in diameter, voids (<1/16") on 20-40% of surface, poorly	Ь	]
					fossiliferous	F	]
_						F	]
20						F	
						ĺ	
		l .				1	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-10	SHEET	2	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

						5 Outer casing and 4 core b			ORIENTATION : VEITICAL
WATER	LEVELS	. I.U IL D	gs on 03/2		START : 3/25/2007	END : 3/26/2007 SOIL DESCRIPTION	LOGGEF	J.	COMMENTS
≩Q∉	04145: -	INITEDITI		STANDARD PENETRATION	<b></b>	JOIL DEGORIF HON		90	OGIVIIVILINIO
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	. ,	TEST RESULTS	SOIL NAM	IE, USCS GROUP SYMBOL,	COLOR.	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H B ATIC		RECOVE	ERY (ft)		MOISTURE	E CONTENT, RELATIVE DEI	NSITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND
LEN EN			#TYPE	6"-6"-6"	CONSISTEN	ICY, SOIL STRUCTURE, MIN	NERALOGY	Σ×Μ	INSTRUMENTATION
22.0		-		(N)	Limestone Fra	anments		1	
					19.6-26.0' - gra	ayish orange, (10YR 7/4), ı	mild HCl -		_
-		10.0	R3-SN		reaction, fine s	sand-sized to fine gravel-siz ments, highly fossiliferous,	zed (up to 1")		=
_					has immediate	mild HCl reaction, carbon	ate materials -	П	_
l _						,	_		_
l _							_	Н	
_							_		
_							-	ш	
-							-		_
25 -							-	┢	-
25 <u> </u>									
-							-	ᆫ	-
-	26.0				26 0-29 5' - 93	ame as 19.6-26.0' except n	nild to no HCI	Н	-
-					reaction	40 10.0 20.0 CAUGHTT		口	-
_							_	┢	_
_							_		_
_							_		_
_							_	Ш	Driller's Remark: Drill rod dropped quickly between 28.0-31.0' in depth, possible void -
									(however, 100% recovery achieved)
_							_	$\vdash$	
30					29.5-31.4' - mc	oderate yellowish brown, (1	I0YR 5/4),		_
12.0					mild HCl reacti	ion, fragments up to 7" with ossiliferous, voids (<1/16")	n interbedded —	Ľ	_
-					of surface	ossimerous, voids (+1/10 )	-	╙	=
-		10.0	R4-SN				-		-
-					31.4-36.0' - ligh	ht olive gray, (5Y 5/2), mild	I to moderate	╁	-
-					HCl reaction, fi moderately fos	ragments up to 3" with sur	face voids,	H	-
_					inoderately los	33111101003	-	Ħ	-
-							-		-
-							-	Ш	_
-							_	口	_
-							_	$\vdash$	_
35								F	_
7.0							_	Ľ	
	36.0							dash	
					Disaggregated	d Interbedded Limestone	4/2) mild to	Ш	
					moderate HCI	rk yellowish brown, (10YR reaction, carbonate materi	4/∠), mild to = fal, part of	Ь	]
1 -					repeating alter	nating sequences of silt ar		Ė	1
-					limestone fragr	ments and core segments	-	Ľ	_
-							-	⊬	-
-							-	匚	-
-							-	$\vdash$	-
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40								H	
L									



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-10	SHEET	3	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

DRILLIN	IG METH	OD AND	EQUIPM	ENT : Rotosonic S	S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION: Vertical
WATER	LEVELS	: 1.0 ft bo	gs on 03/2	25/07	START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard
>				STANDARD	SOIL DESCRIPTION COMMENTS
N A N S	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	
H H H		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR,  MOISTURE CONTENT RELATIVE DENSITY OR  DRILLING FLUID LOSS TESTS AND
FYF AV			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
ESE ESE				(N)	6
45_0.8 SURFACE AND 25_0.9 SURFACE AND 25_0.0 SURFAC	46.0	10.0			MOISTURE CONTENT, RELATIVE DENSITY OR │ 💆 │ DRILLING FLUID LOSS, TESTS, AND
60					



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-10	SHEET	4	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	ft bgs	s on 03	3/25/07 START: 3/25/2007 END: 3	/26/20	07 LOGGER : J. Burkard	
≥∩≘	. (%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	56.0		NA	56.0-66.0' - NA	Н		
-18.0 -18.0 -18.0	R7-SN 10 ft 100%	NA	NA	-		Limestone Fragments With Silt  56.6-64.0' - moderate yellowish brown, (10YR 5/4), strong HCI reaction  Limestone Fragments  64.0-66.0' - moderate yellowish	NA = Not Applicable NR = No Recovery -
65 -23.0 - - - - - - - - - - - - - - - - - - -	R8-SN 10 ft 100%	NA	NA	66.0-76.0' - NA		- 64.0-66.0' - moderate yellowish brown, (10YR 5/4), moderate to strong HCI reaction, limestone fragments up to 3", voids (<1/16") on 50-75% of surface of fragments 66.0-66.5' - light olive gray, (5Y 5/2), fine grained, moderate HCI reaction, fragments up to 3", trace voids on surface of fragments 66.5-76.0' - moderate yellowish brown, (10YR 5/4), moderate to strong HCI reaction, fragments and core segments (up to 3") with pulverized rock, poorly fossiliferous, voids (<1/16") on 50-75% of surface of fragments	Rock fragments are most likely pulverized due to drilling method



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-10	SHEET	5	OF	14	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	) ft bgs	s on 03	3/25/07 START: 3/25/2007 END: 3	26/200	7 LOGGER : J. Burkard	
≥∩ ∵	. (6			DISCONTINUITIES	ي	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - - 80				76.0-86.0' - NA		Limestone Fragments  76.0-86.0' - Same as 66.5-76.0' except pulverized rock fragments <1/4" in diameter	Pulverized rock most likely is more cohesive rock that has been broken up as a result of the sonic drilling method
-38.0 - - - - - - - - - - - - - - - - - - -	R9-SN 10 ft 100%	NA	NA	-		- - - - - - -	_
-90 -48.0 	R10-SN 10 ft 100%		NA	86.0-96.0' - NA		Disaggregated Limestone 88.6-89.2' - dusky yellowish brown, (10YR 2/2), strong HCl reaction, carbonate material Limestone Fragments 89.2-96.0' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, fragments and core segments with pulverized gravel-sized particles, voids (<1/16") on 25-50% of fragment surfaces, poorly to non fossiliferous	Gravel-sized particles most likely part of cohesive rock but broken by drilling method



PROJECT NUMBER:	BORING NUMBER:		
338884.FI	I-10	SHEET	6 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	ft bgs	s on 03	3/25/07 START: 3/25/2007 END: 3	/26/20	07 LOGGER : J. Burkard	
≥∩≘	_ (6			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	R11-SN 10 ft 100%	NA	NA	96.0-106.0' - NA		Limestone Fragments - 96.0-106.0' - Same as 89.2-96.0'	Lost circulation during run at 96.0-106.0'
- - - 110 -68.0 - - - - - 115 -73.0	106.0 R12-SN 10 ft 1 100%		NA	106.0-116.0' - NA		106.0-116.0' - dark yellowish orange, (10YR 6/6), moderate to strong HCI reaction, voids (<1/16") on 25-50% of surface, fragments and core segments up to 5" in length, with sections of pulverized rock that is gravel to coarse sand-sized particles	Pulverized rock most likely is more cohesive rock that has been broken up as a result of the sonic drilling method



PROJECT NUMBER:

33884.FL BORING NUMBER:

I-10 SHEET 7 OF 14

# **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	ft bgs	s on 03	3/25/07 START: 3/25/2007 END: 3/	26/200	D7 LOGGER : J. Burkard	
≥0 <i>≎</i>	(%			DISCONTINUITIES	ပ္မ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-120 -78.0 	R13-SN 10 ft 100%	NA	NA	116.0-126.0' - NA		Limestone Fragments  116.0-116.8' - dark yellowish orange, (10YR 6/6), mild to no HCI reaction, pulverized limestone fragments, coarse to medium sand-sized particles  116.8-119.5' - light olive gray, (5Y 5/2), fine grained, mild HCI reaction, trace voids on surface, fragments are up to 4"  119.5-124.8' - yellowish gray, (5Y 7/2), mild HCI reaction, extremely weak (R0), fragments with sections of pulverized limestone particles that are coarse to medium sand-sized up to 1-1/2" in length, voids (<1/16") on 25-50% of surfaces  Silt (ML) 124.8-126.0' - yellowish gray to pale	End coring for the day 3/25/07 at 116.0'
	126.0 R14-SN 10 ft 95%	NA	NA	126.0-136.0' - NA		greenish yellow, (5Y 7/2 to 10YR 8/2), strong HCI reaction, carbonate material  Limestone Fragments 126.0-134.0' - dusky yellow and yellowish gray, (5Y 6/4 and 5Y 7/2), mild HCI reaction, core segments and fragments of limestone with sections of pulverized rock, voids (<1/16") on 15-25% of surface	Sharp lithologic contact between the two types of limestone, 126.0-134.0' and 134.0-135.5'
	136.0		1411		$\prod$		



PROJECT NUMBER:	BORING NUMBER:		
338884 FI	I_10	QUEET	8 OF 14

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

SELOW E AND ION (ft)	_(%)			DISCONTINUITIES		LITLIOL COV	
SELO E AN	_ ೧೯			DIOCONTINOMIEC	ပ္မ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
140 -98.0 - - - - - - - - - - - - - - - - - - -	R15-SN 10 ft 100%		NA	136.0-146.0' - NA		Limestone Fragments  134.0-135.5' - yellowish gray and medium gray, (5Y 8/1 and N5), mild to moderate HCl reaction, limestone fragments and core segments up to 6" in length, sharp color contact on some core segments and fragments, poorly fossiliferous, few cavities (1/4"-1/2" in size) present on core between 135.0-135.5'  No Recovery 135.5-136.0' Limestone Fragments  136.0-137.5' - yellowish gray, (5Y 7/2), mild HCl reaction, gravel-sized rock fragments, voids (<1/16") on 15-25% of surface with small (1/4") surface cavities (possible solution cavities)  137.5-140.2' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, mild HCl reaction, fragments up to 8" in length, consisting of void-rich limestone (light olive gray), interbedded with fine grained limestone (yellowish gray) in intervals up to 1" thick, up to 20% coverage of small (1/16") voids 140.2-144.5' - dusky yellow, (5Y 6/4), mild HCl reaction, pulverized	- - - - - - - - - - - - - - - - - - -
150 -108.0	R16-SN 10 ft 100%		NA	146.0-156.0' - NA		limestone in medium to fine sand-size particles and rock fragments up to 3" in diameter 144.5-146.0' - light olive gray, (5Y 6/1), moderate HCl reaction, core segments up to 4" in length, trace voids on surface 146.0-147.9' - light olive gray, (5Y 6/1), mild to moderate HCl reaction, trace voids on surface 147.9-152.0' - dusky yellow, (5Y 6/4), moderate HCl reaction, gravel-sized limestone fragments with pulverized limestone (silt-sized particles)  152.0-153.3' - light olive gray to medium bluish gray, (5Y 6/1 to 5B 5/1), core segments up to 5" in length 153.3-154.5' - Same as 147.9-152.0' except contains a core segment up to 4" in length 154.5-156.0' - Same as 152.0-153.3'	Repeating alternating sequences from 147.9- 156.0'



PROJECT NUMBER:	BORING NUMBER:					Т
338884.FL	l I-10	SHEET	9	OF	14	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	) ft bgs	s on 03	3/25/07 START : 3/25/2007 END : 3/	26/200	7 LOGGER : J. Burkard	
<b>₹</b> 0₽	(%			DISCONTINUITIES	၂ ွ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 160 -118.0	R17-SN 10 ft		NA	156.0-166.0' - NA		Limestone Fragments  156.0-161.2' - dusky yellow, (5Y 6/4), mild HCl reaction, fragments up to 4" in diameter, voids (<1/16") on 25-50% of surface, sections of coarse to medium sand-sized particles of pulverized limestone	
- - - - 165 -123.0	100%					161.2-166.0' - light olive gray, (5Y 5/2), dense, fine grained, mild HCl reaction, fragments and core segments up to 2" in length, trace voids on surface	
- - - - -				166.0-176.0' - NA		Limestone  166.0-168.8' - dusky yellow, (5Y 6/4), coarse to medium grained, mild HCI reaction, cavities (1/4" in diameter) present on surface, fragments up to 8" in length	
-170 -128.0 - - - - - - - - -	R18-SN 10 ft 1 100%		NA			Limestone Fragments 168.8-175.7' - dusky yellow, (5Y 6/4), fine grained, mild HCI reaction, gravel-size particles and core fragments up to 6" long, trace voids on surface	
175_ -133.0 -	176.0			_		-  -	_



PROJECT NUMBER:	BORING NUMBER:					_
338884 FI	I <sub>-</sub> 10	CHEET	10	ΩE	11	

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	ft bgs	s on 03	3/25/07 START: 3/25/2007 END: 3	/26/200	7 LOGGER : J. Burkard	
<b>≥</b> ∩⊊	(%			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
- - - - 180 - - 138.0 - - - - - - - - - - - - - - - - - - -	R19-SN 10 ft 100%		NA	176.0-186.0' - NA		Disaggregated Limestone  175.7-176.0' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, carbonate sand with 10-20% silica content Limestone Fragments 176.0-179.9' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, gravel-sized particles between 1/4"-1" in diameter, all carbonate materials  179.9-185.0' - dusky yellow, (5Y 6/4), strong HCl reaction, core segments up to 4", voids (<1/16") over 50-75% of surface, numerous cavities on surface, poorly to highly fossiliferous, some interbedded clay between 184.1-185.0'	
	R20-SN 10 ft 87%		NA	186.0-196.0' - NA		6/1), fine grained, mild HČI reaction, core segments up to 3" in length Disaggregated Limestone  186.0-186.5' - light olive gray, (5Y 6/1), strong HCI reaction, silt-sized with coarse sand-sized particles, possibly slough material, all carbonate material Limestone Fragments  186.5-187.5' - light olive gray, (5Y 6/1), dense, fine grained, mild HCI reaction, core segments up to 2" in length, fragments 1/4"-1" in diameter 187.5-194.7' - yellowish gray, (5Y 7/2), mild to moderate HCI reaction, core segments up to 3" in length, fragments 1/2"-2" in diameter, moderate to highly fossiliferous, numerous surface cavities present on limestone	
195_ -153.0 _	196.0		NR	-		No Recovery 194.7-196.0' -	_



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	I-10	SHEET	11	OF	14

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

Second   Comments	WATER	LEVELS: 1.0	ft bgs	s on 03	3/25/07 START: 3/25/2007 END: 3	3/26/200	D7 LOGGER : J. Burkard	
196.0-206.0' - NA	≥ ∩ ∵	. (9)			DISCONTINUITIES	ق	LITHOLOGY	COMMENTS
196.0-206.0' - NA	DEPTH BELOV SURFACE ANI ELEVATION (ft	CORE RUN, LENGTH, AND RECOVERY (%	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LO	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
206.0  206.0-216.0' - NA  206.0-	-158.0 - - - - - - - - 205	R21-SN 10 ft		NA	196.0-206.0' - NA		- 196.0-198.0' - light olive gray, (5Y 5/2), strong HCl reaction, silt with sand-sized particles and gravel-sized limestone fragments, all carbonate  - 198.0-200.0' - light olive gray, (5Y 6/1), fine grained, mild HCl reaction, fragments 1/2"-4" in diameter, several surface cavities (1/4"-1/2") at 198.2-198.5', fracture at 45 deg through one cavity 200.0-205.0' - fragments range from 1/4"-3", possible breccia zone, matrix appears as for material from 198.0-198.0', clasts appear as for material from 198.0-200.0'	
	210 -168.0 -	R22-SN 10 ft 100%		NA	206.0-216.0' - NA		<ul> <li>6/1), very fine grained, moderate HCI reaction, fragments and core segments up to 4" in diameter</li> <li>206.0-216.0' - light olive gray, (5Y 6/1), strong HCI reaction, coarse sand-sized particles and rock fragments up to 4", highly fossiliferous, voids (&lt;1/16") over</li> <li>25-50% of surface, with isolated sections of fine grained, dense, yellowish gray (5Y 7/2) core segments and fragments, with strong</li> <li>HCI reaction, at 210.0-210.4",</li> </ul>	



PROJECT NUMBER:

33884.FL BORING NUMBER:

I-10 SHEET 12 OF 14

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	ft bgs	s on 03	3/25/07 START : 3/25/2007 END : 3/	26/200	D7 LOGGER : J. Burkard	
≥∩≘	_ (6			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-178.0	R23-SN 10 ft 100%	NA	NA	216.0-226.0' - NA		Limestone Fragments  216.0-217.5' - light olive gray, (5Y 6/1), strong HCl reaction, with sand-sized particles and gravel-sized rock fragments, all carbonate material  217.5-219.2' - yellowish gray, (5Y 7/2), dense, fine grained, moderate HCl reaction, fragments up to 4" in diameter, poorly fossiliferous  219.2-221.4' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, void rich, poorly fossiliferous	Apparent repeating sequences at 217.5-225.0'
- - - 225 -183.0	226.0					222.2-225.0' - Same as 219.2-221.4'  Disaggregated Limestone 225.0-226.0' - yellowish gray, (5Y 7/2), moderate HCI reaction,	
- 230 -188.0 	R24-SN 10 ft 1 100%	NA	NA	226.0-236.0' - NA		carbonate material  Limestone Fragments  226.0-236.0' - dark yellowish orange, (10YR 6/6), sand-sized particles to gravel-sized limestone fragments, strong HCI reaction for the silt and sand-sized particles, mild to moderate HCI reaction for gravel-sized fragments, limestone fragments are easily distinguished as either fine grained, yellowish gray (5Y 7/2), dense, and poorly fossiliferous with moderate HCI reaction, or as void rich, yellowish gray (5Y 7/2), poorly fossiliferous, with mild to moderate HCI reaction	Silt and limestone fragments are most likely cohesive rock that has been broken up by the sonic drilling method
	∠30.U						



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	I-10	SHEET	13	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	ft bgs	s on 03	3/25/07 START : 3/25/2007 END : 3/	26/200	7 LOGGER : J. Burkard	
≥ ∩ ∷	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
-40 -198.0 -198.0 	R25-SN 10 ft 100%	NA	NA	236.0-246.0' - NA		Limestone Fragments  236.0-246.0' - Same as 226.0-236.0' except with isolated sections of fine grained and void-rich limestone	-
250 -208.0 -228.0 -2255 -213.0	246.0 R26-SN 10 ft 1 100%		NA	246.0-256.0' - NA		246.0-256.0' - Same as 236.0-246.0' except less void-rich limestone (only trace to 10% coverage of small [<1/16"] voids)	Original page of field log (246.0-256.0') "lost", page re-written by original logger J. Burkard on 2/7/08 based on photographs of recovered material



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l I-10	SHEET	14	OF	14	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1723172.2 N, 458130.7 E (NAD83)

ELEVATION: 42.0 ft (NAVD88) DRILLING CONTRACTOR: Prosonic, Ocala, FL; Driller: N. Gamache

WATER	LEVELS: 1.0	ft bgs	s on 03	3/25/07 START: 3/25/2007 EN	ID: 3/26/2	007	LOGGER : J. Burkard	
≥0 ∷	(9)			DISCONTINUITIES	ပ္	L	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTN	Iÿ		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
260 -218.0 - - - - - - 265 -223.0	R27-SN 10 ft 100%	χ.	FRA FEA	THICKNESS, SURFACE STAINING, AND TIGHTN 256.0-266.0' - NA	KSS H H H H H H H H H H H H H H H H H H		Elimestone Fragments 256.0-266.0' - Same as 226.0-236.0'  Bottom of Boring at 266.0 ft bgs on 3/26/2007	Completed drilling hole at 16:40 on 3/26/07 to 266.0', however total depth tagged on 3/27/07 at 267.0' below ground surface  Borehole grouted to surface with 4" schedule 40 PVC pipe down hole; depth inside PVC pipe re-tagged at 267'3" below ground surface after grouting



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	IT-01	SHEET	1	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705495.9 N, 457735.8 E (NAD83)

DRILLING METHOD AND EQUIPMENT: CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 3-7/8" tri-cone bit

ELEVATION: 20.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

					N 252437, Mud Totally, auto Hammer, NW Tous, 3-776 th-cone bit.  ORIENTATION: Vehical
WATER	LLVELO	: 42.0 ft b	790 UII 0/2		START : 6/27/2007 END : 6/29/2007 LOGGER : J. Schaeffer, D. Thomas  SOIL DESCRIPTION COMMENTS
<u>\$</u> 9€	SAMPI F	INTERVA	l (ft)	STANDARD PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  SOIMMENTO DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (#)	O/ WIII EE	RECOVE	` ,	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,
TH I		RECOVE	#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR ONSISTENCY, SOIL STRUCTURE, MINERALOGY SINSTRUMENTATION
ESE ESE			#ITPE	(N)	
20.9	0.0				Topsoil Topsoil
_		1.2	SS-1	1-5-10 (15)	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-	1.5			(10)	0.2-1.2' - grayish orange, (10YR 7/4), orange, dry to
-					moist, medium stiff, nonplastic, strong HCl reaction, 30 % fine to coarse sand-sized material, 30% fine to
-					coarse gravel-sized material
-					11
_					Driller's Remark: Sand at 3.0-3.5'
_					11
					] [
5_	5.0				11
15.9				0.6	Poorly Graded Sand With Silt (SP-SM)  5.0-5.6' - moderate yellowish brown, (10YR 5/4),
		0.6	SS-2	2-3-4 (7)	\ moist to wet, loose, no to moderate HCl reaction, fine /
	6.5			(, )	\silica sand, trace medium grained carbonate sand, \ \ \frac{1}{-} \ \ \trace nonplastic fines
					trace nonplastic lines
					] [
					] [
					] [
					] [
					11
10	10.0				11
10.9					Poorly Graded Sand With Silt (SP-SM)  \[ \] 10.0-10.3' - Same as 5.0-5.6' except dark yellowish \[ -\frac{\frac{1}{1}}{1} \]
		0.6	SS-3	3-3-3 (6)	brown, (10YR 4/2), mottled, 5-10% nonplastic fines,
	11.5			(0)	trace medium sand-sized carbonate sand
					Poorly Graded Sand With Silt And Organics (SP-SM)
					10.3-10.6' - grayish brown, (5YR 3/2), moist, loose, no HCI reaction, fine silica sand, 15-20% fines that
					appear to be very fine grained organics, nonplastic
] ]					fines
					] [
					] [
15	15.0				
5.9				F 7 44	Poorly Graded Sand (SP) 15.0-15.8' - dark yellowish brown, (10YR 4/2), white,
		0.8	SS-4	5-7-11 (18)	moist, medium dense, nonplastic, no HCl reaction,
	16.5			/	\fine silica sand
					] ]
_					]
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20					



PROJECT NUMBER:	BORING NUMBER:				
338884 FI	IT_01	CHEET	2	OE	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705495.9 N, 457735.8 E (NAD83)

ELEVATION: 20.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WAIERL								Cohooffor D Thomas
1	LVLLO	. 42.U IL	gs on 6/2		TART : 6/27/2007 END : 6/29/2007 SOIL DESCRIPTION	LUGGER	. J. i	Schaeffer, D. Thomas  COMMENTS
≥9€ T	CAMPLE	INTERVA	I (ft)	STANDARD PENETRATION	GOIL DEGOMI TION		90.	GOWINIENTO
ON ON O	SAIVIFLE			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLO	OR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
FAC		RECOVE	_ ` `		MOISTURE CONTENT, RELATIVE DENSITY CONSISTENCY, SOIL STRUCTURE, MINERAL		IBOI	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	CONSISTENCE, SOIL STRUCTURE, WIINERAL	.001	SYN	INSTRUMENTATION
0.9	20.0			. ,	Poorly Graded Sand With Silt (SP-SM)		TH	
1 1		0.9	SS-5	11-10-13	20.0-20.9' - pale yellowish brown, (10YR 6/2), o yellowish brown (10yr 4/2), moist, medium den			<del>-</del>
1 1	21.5			(23)	silica sand, trace carbonate sand in first 0.2', tr	ace /		-
1 +	21.0				nonplastic fines, no HCl reaction in silica, mild carbonate	in / -		-
1 1					Carbonate		l	-
1 1						-	1	-
1 1						-	1	-
1 1						-	1	-
1 -						-		-
	05.0					-		-
25 -4.1	25.0				Poorly Graded Sand (SP)			-
		0.8	SS-6	4-5-5	25.0-25.8' - dark yellowish brown, (10YR 4/2), ¬ mottled, wet, loose, no HCl reaction, fine silica	cond =		-
1 1	00.5	0.0	000	(10)	trace nonplastic fines	sand, /_		-
1 +	26.5							-
1 -						_	l	-
1 1						-		-
1 1						-	1	-
1 -						-		-
1 -						-		-
	00.0					-	l	-
30 -9.1	30.0				Poorly Graded Sand (SP)			_
1 -		0.9	SS-7	2-3-4	$\setminus$ 30.0-30.9' - Same as 25.0-25.8' except mottled	and /=		-
1 1	24.5	0.0	00 /	(7)	banded	/ -		-
1 +	31.5					_	l	-
1 1						-	1	-
1 1						-		-
						-		-
						-		-
-						-	1	Driller's Remark: Very soft at 33.0', possible
] , -	25.0					-		change of material in SS-8
35 -14.1	35.0				Interbedded Organic Soil (SP)			-
-		1.5	SS-8	0-0-0	35.0-35.6' - dusky brown, (5YR 2/2), wet, 60%	organic _		-
-	26.5	1.5	55-0	(0)	soil and 40% poorly graded sand; organic soil of low to medium plasticity, slow dilatancy, no HC	ı /-		-
1 +	36.5				reaction; poorly graded sand is fine grained, poorly orange silica grains, 10-15% organic fines, no	ossible		-
					reaction	no   -		-
					Poorly Graded Sand Grading To Silty Sand V	Vith -		-
					Organics (SP) 35.6-36.5' - dusky brown, (5YR 2/2), wet, very	loose,   -		Driller's Remark: Gravelly material at 38.0'
					no HCl reaction, fine sand, possible orange sili	ca -	1	(like SS-9)
					grains, trace coarse sand-sized pyrite grains, 1 low plastic fines, increasing with depth, appear		1	-
					organics		1	-
40							$\vdash$	-



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	IT-01	SHEET	3	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705495.9 N, 457735.8 E (NAD83)

ELEVATION: 20.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

DRILLIN	GIVIETH	OD AND	EQUIPIN	ENT: CIVIE 75 S/	N 252437, mud rotary,	auto hammer, NW rods, 3-7	/8" tri-cone bit		ORIENTATION : Vertical
WATER	LEVELS	: 42.0 ft l	ogs on 6/2	28/07	START : 6/27/2007	END: 6/29/2007	LOGGEF	R : J.	Schaeffer, D. Thomas
1.				STANDARD		SOIL DESCRIPTION		ניז	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS				SYMBOLIC LOG	
BE 4		RECOVE	ERY (ft)	TEST RESOLTS		USCS GROUP SYMBOL, C		일	DEPTH OF CASING, DRILLING RATE,
H Ä Ä				011 011 011		CONTENT, RELATIVE DENS Y, SOIL STRUCTURE, MINE		B <sub>C</sub>	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#TYPE	6"-6"-6" (N)	CONGIGILITO	r, doie officorone, minte	IVILOOT	SYI	INCTICIMENTATION
-19.1	40.0			. ,	Silty Sand (SM)			Ш	
-	1	1.3	SS-9	3-5-8	40.0-41.3' - mixed	d yellowish gray, medium	light gray, -	1111	-
-		1.3	33-9	(13)		(5Y 8/1, N6, 5B 7/1), wet, CI reaction, fine to coarse s		<b>-</b>	<del>-</del>
-	41.5				shells and limesto		/-	1111	_
l _								1	_
l _							_	]	
-	1						-	1	_
-	1						-	1	-
-							-	1	Driller's Remark: 100% loss of circulation at
-							-	1	44.0-44.5'
45 <u> </u>	45.0				Cilty Crayala (Of	M			Finished drilling at 45 01 at and at 6/07/07 at
-24.1				12-41-40	Silty Gravels (GM 45.0-45.8' - 50/50	พ) ว split in sample; lenses al	ternates	<b> </b>    .	Finished drilling at 45.0' at end of 6/27/07 at 18:00 –
l _	[	0.8	SS-10	(81)	☐ 1"-2-1/2" thick lim	nestone fragments are me	dium gray 🕝		Driller set HW casing
	46.5			. ,		reaction, same as SS-9, a sized, silt with sand (ML) i			Driller's Remark: Caving at 16.0-17' (possible water table); casing is dry up to
						wet, very soft, nonplastic,		1	43.5'.
-	1				dilatancy, 10-20%	% very fine sand-sized par	ticles, mild	1	[ _ · · ·
-	1				to moderate HCI	reaction, carbonate mater	ials -	1	On 6/28/07 water table is at 42.0'; resume – drilling at 07:30 AM
-	-						-	1	Driller's Remark: Alternating layers of soft
-	-						-	1	and hard material between 45.0-50.0'; lost –
-	-						-	1	circulation at 45.0'
-							-	1	_
50	50.0							<u> </u>	
-29.1				04.07.47	Silty Gravels (GN	<b>M)</b> e as 45.0-45.8' except lime	estone in -		_
		1.4	SS-11	31-27-17 (44)		icles, one 1" fragment in n			
	51.5			(,		oarse angular gravel-sized	l limestone		
-					\from 51.0-51.4'; s	silt is same as SS-10		1	_
-	1						-	1	=
-	-						-	1	-
-							-	1	-
-	-						-	1	_
-							-	1	_
I _							-	1	
55	55.0								
-34.1	55.6	0.5	SS-12	50-50/1.5		nestone Gravel With Silt	And Sand		
-	33.0			(100/7.5")	( <b>GW)</b> 55 0-55 5' - Same	e as 45.0-45.8' except me	dium grav		_
-	1				to moderate yello	wish brown, (N5, 10YR 5/	4), wet,	1	-
-	-					el is in both colors and fine		1	-
-						to coarse angular gravel-sine to coarse angular sand		1	-
-					material, 15% no	nplastic fines, gray materi	al has   -	1	-
-						on, brown material has mi action, all carbonate mate		1	Deillorio Domoniu Chong - t- 00 40t
l _					Iniouerate norrea	action, all carbonate mate	iiai5	1	Driller's Remark: Change to SS-13 material at 58.0'; Install casing to 60.0'
									at 55.5 , motali basing to 50.0
							-		]
60	1						-	1	
<u> </u>								T	
					I			1	



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	l IT-01	SHEET	4	OF	8	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705495.9 N, 457735.8 E (NAD83)

ELEVATION: 20.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WATER	LEVELS	: 42.0 ft l	ogs on 6/2	28/07	START : 6/27/2007 END : 6/29/2007 LOGGER : J. Schaeffer, D. Thomas
				STANDARD	SOIL DESCRIPTION COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	SAMPLE	INTERVA	. ,	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
TH BE		RECOVE			MOISTURE CONTENT, RELATIVE DENSITY OR  DRILLING FLUID LOSS, AND  ONLY ONLY ONLY OF THE MANUEL AND THE MANUEL AN
DEP' SURI ELE			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY
-39.1	60.0			10.10.05	Silty Sand With Limestone Fragments (SM) 60.0-61.2' - moderate yellowish brown, (10YR 5/4),
_		1.2	SS-13	16-19-25 (44)	wet, dense, fine to coarse grained, nonplastic, mild HCl reaction, 20-25% silt, 15% fine gravel, carbonate
_	61.5				materials -
-					Driller's Remark: Hard at 62.0'
-					-
-					
					] [
-					Driller's Remark: Softer at 64.0', circulation returns, installed 10' more casing (to 65.0')
65 <u> </u>	65.0 65.3	0.3	SS-14	50/3.0	Sandy Silt (ML)  Driller's Remark: 65.0-70.0' drilling hard, a
	00.0		00-14	(50/3.0")	65.0-65.3' - Same as 60.0-61.2' except mild to
-					moderate HCl reaction, 25% sand, predominantly fine / sands, trace medium coarse sand, all carbonate
-					\material -
					] [
-					
_					
-					
70	<del>7</del> 8.9				
-49.1	70:4	0.0	\SS-15	50/1.0 (50/1.0")	No Recovery 70.0-70.1'  Driller's Remark: Hard from 70.0-75.0', little chatter
-				(30/1.0)	- Unatter
-					
-					
-					
-					<b>                                     </b>
					] [
-					
75 <u> </u>	74.9	0.0	\SS-16		No Recovery 75.0-75.1'
-				(50/1.5")	Begin Rock Coring at 75.0 ft bgs See the next sheet for the rock core log
-					
-					]
-					] ]
-					
-					
-					
80					
1	l				l



FRACTURES PER FOOT

0

2

1

1

1

1

2

>10

3

3

3

>10

5

NR

8

3

0

35

nearly healed

undulating, tight

healed

fractures

tight

smaller

fracture

tight to open

tiaht

RQD(%)

100 0

WATER LEVELS: 42.0 ft bgs on 6/28/07

CORE RUN, LENGTH, AND RECOVERY (%)

75.0 R1-HQ

76.0

1 ft

100%

R2-HQ

5 ft | 97 | 1

100%

R3-HQ

5 ft | 63 | 1

100%

R4-HQ

5 ft

88%

R5-HO

5 ft

68%

28 7

DEPTH BELOW SURFACE AND ELEVATION (ft)

-54.1

80

-59 T

85

-64 1

90

-69.7

95

91.0

86.0

81.0

PROJECT NUMBER:	BORING NUMBER:			
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#### **ROCK CORE LOG**

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1705495.9 N, 457735.8 E (NAD83)

START: 6/27/2007

**DESCRIPTION** 

DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND

THICKNESS, SURFACE STAINING, AND TIGHTNESS

76.95, 79.85, 80.55' - Fracture (3), 25 deg and 45 deg, rough, planar to undulating, tight

77.4' - Fracture, 30 deg, rough, undulating,

77.75' - Fracture, horizontal, rough, planar,

78.3' - Fracture, horizontal, rough, planar to

81.9' - Fracture, horizontal, rough, planar

with a 1" fragment wedge between 2

82.35' - Fracture (2), 30 deg, rough, planar,

83.95' - Fracture, 50 deg, rough, stepped,

84.85' - Fracture, 60 deg, rough, undulating,

85.0-85.15' - Fracture zone, small 1/4 and

85.15, 85.4, 85.75' - Fracture (3), 10 deg,

85.5' - Fracture, 80 deg, rough, undulating to stepped, from 85.15 to 85.75

85.85' - Fracture, 70 deg, rough, undulating,

from 85.75 to 86.0 continuation of overlying

86.2' - Fracture, 75 deg, rough, undulating,

fragmentation and debris, nearly fracture

87.0, 87.2' - Fracture (2), 10 deg, rough,

87.65' - Fracture, 10 deg and 30 deg, rough,

undulating to stepped, tight to healed 88.75' - Fracture, 75 deg, rough, stepped, tight, bounded by fractures at 88.15 and

89.15' - Fracture, 20 deg, rough, stepped,

very open fracture with significant

88.45' - Fracture, horizontal, rough,

very open with fragmentation

89.5-89.8' - Fracture zone

planar, open, rounded

undulating, open

89 15'

86.55' - Fractures, horizontal, rough, stepped,

84.55' - Fracture, 10 deg, rough, planar

leading to fracture zone at 85.0'

rough, undulating to stepped

ELEVATION: 20.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

END: 6/29/2007

9

CORING METHOD AND EQUIPMENT: CME 75 S/N 252437, mud rotary, HQ tools, HW casing

DISCONTINUITIES

LOGGER: J. Schaeffer, D. Thomas LITHOLOGY COMMENTS ROCK TYPE, COLOR SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS Switch to coring; finished Limestone 75.0-76.0' - moderate yellowish soil drilling at 15:30 on brown, (10YR 5/4), fine grained, 6/28/07 moderate HCI reaction, weak (R2), R1: 3 minutes voids (up to 1/16") cover 20% of the surface area, one large 3/4" deep and 4" long cavity, 2"X3/16" with up to 1/8" calcite crystals 76.0-77.55' - Same as 75.0-76.0' except moderate yellowish brown to dark yellowish orange, (10YR 5/4, SC-1 collected at 78.5-10YR 6/6), weak to very weak (R2 to 79.5 R1), voids (up to 1/16") cover 5-25% of the surface area, voids coverage Drilled twice as fast from decreases with depth 79.5-81.0' 77.55-79.5' - light olive gray, (5Y R2: 17 minutes 5/2), fine to coarse grained, moderate HCI reaction, medium strong (R3), 25% of the rock grains are sub angular to sub rounded, voids (up to 1/16") cover 10% of the surface, voids (1/8"-3/16") cover 10% of the surface, shallow and elongated cavities up to 2" long 79.5-81.0' - Same as 79.5-81.0 except grayish orange, (10YR 7/4), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (up to 1/16") cover 25% of the surface, few voids (1/8"-3/16"), no cavities R3: 8 minutes 81.0-86.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCI reaction, medium strong (R3), voids (<1/16") cover 25-30% of the surface area, few cavities (1/4"-1/2"), somewhat friable; except 81.7-82.1' weak rock (R2), voids cover 5% of the surface 86.0-86.55' - Same as 81.0-86.0' except medium strong (R3), 25-30% void coverage 86.55-87.65' - moderate yellowish Driller's Remark: 50% brown, (10YR 5/4), fine grained, circulation loss moderate HCI reaction, very weak (R1), voids (<1/16") cover 0-5% of the surface, 1/4"-1/2" thick trace R4: 9 minutes planar bedding 87.65-88.6' - Same as 86.0-86.55' Driller's Remark: 100% 88.6-88.7' - light olive gray, (5Y 5/2), circulation loss as soon as very fine grained, moderate HCI drilling starts at 91.0'; reaction, strong (R4), 20% sub 100% loss through to 96.0' angular coarse sand-sized particles (possible shell fragments), voids (up to 1/16") cover 3% of the rock surface, cavities (up to 1/2") 88.7-89.8' - Same as 86.0-86.55' 89.8-90.4' - Same as 86.0-86.55' except light olive gray, (5Y 5/2), strong to very strong (R4 to R5) No Recovery 90.4-91.0'



PROJECT NUMBER:

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BORING NUMBER:

IT-01

SHEET 6 OF 8

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705495.9 N, 457735.8 E (NAD83)

ELEVATION: 20.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, HW casing

WATER	LEVELS : 42	.0 ft b	gs on (	6/28/07 START : 6/27/2007 END : 6/	29/200	D7 LOGGER : J. Schaeffer, D. Thom	nas
≥∩ ∷	6)			DISCONTINUITIES	Ğ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	5070	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BE	E RU STH, OVEF	(%) <sub>Q</sub>	TUF	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30Li	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
LEV EV	SORE	Ø	RAC ER I	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
- <b>74</b> .1	0716	ď	NR	89.8' - Fracture, 30 deg, rough, undulating,	S	Limestone	R5: 15 minutes
'			INIX	open to fracture zone	H	<ul> <li>91.0-91.65' - light olive gray, (5Y</li> </ul>	No. 15 minutes
-	96.0			90.05' - Fracture, 20 deg, rough, stepped, very open	Ш	5/2), fine grained, moderate HCI reaction, weak (R2), voids cover 25%	Added EZ-Mud, still 100%
-			0	90.2' - Fracture, 70 deg, rough, undulating,	₽₩	of the surface, 3% gray voids, same	water loss -
-				fracture to fragmentation 91.25' - Fracture, 30 deg, smooth, undulating	Ш	as 88.6-88.7' 91.65-93.0' - light olive gray, (5Y	-
l -			0	91.45, 91.5, 91.6, 91.65' - Fracture (4),	Ш	- 5/2), fine grained, moderate HCl	-
_				horizontal, rough, planar, open fragmentation (sub angular) from 91.6-91.65'	$\vdash$	reaction, strong (R4), transition to moderate yellowish brown	_
_	R6-HQ 5 ft	62	2	92.2' - Fracture, 40 deg, rough, planar,	Н	<ul> <li>particularly at the top and bottom,</li> </ul>	_
_	100%			healed with trace fragmentation (sharp angular)		voids (up to 1/16") cover 15-20% of the surface, 1/2" cavities and fossil	_
_			3	92.35' - Fracture, 20 deg, rough, planar,	Ш	- casts	_
100_ -79.1				fragments, joins with 92.2 fracture 92.55' - Fracture, horizontal, smooth, planar	₽₩	93.0-94.4' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction,	
-79.1			>10	93.0' - Fracture, 70 deg, rough, undulating,	Щ	weak to medium strong (R2 to R3),	R6: 5 minutes
-	101.0			tight 93.2' - Fracture, 20 deg, rough, undulating,	ш	5% rounded coarse fragments, voids (up to 1/16") cover 10% of the	-
-			0	tight .	ш	_ surface	-
_				93.65' - Fracture, 70 deg, rough, undulating, tight	H	No Recovery 94.4-96.0' Limestone	-
_			1	93.8-93.95' - Fracture zone	$\square$	_ 96.0-98.1' - dusky yellow, (5Y 6/4),	-
_	D7.UO			93.95' - Fracture, 10 deg, rough, stepped, open	H	fine grained, moderate HCl reaction, weak to medium strong (R2 to R3),	-
_	R7-HQ 5 ft	77	1	98.3' - Fracture, 25 deg, rough, undulating,	Ш	voids (up to 1/16") cover 30-40% of	-
-	96%			tight 98.55' - Fracture, 80 deg, rough, undulating,	Н	the surface, trace elongate cavities up to 3/4"X1/4", trace organics (up to	100 % water loss from
-			1	that starts at 98.3 and ends as unbroken fracture at 98.8,	Ш	_ 1/4")	101.0-106.0'
105 -84.1				99.45' - Fracture, 50 deg, rough, planar, tight —	ш	98.1-101.0' - moderate yellowish — brown, (10YR 5/4), fine grained,	R7: 14 minutes
-			2	99.6' - Fracture, 70 deg, rough, undulating to planar, tight extends from 99.45 to 99.65'	Ш	moderate HCl reaction, weak to very weak (R2 to R1), voids (up to 1/16")	-
-	106.0		NR	99.65' - Fracture, 30 deg, rough, planar, tight	Ш	cover 5-15% of the rock surface,	-
-			>10	100.1' - Fracture, horizontal, rough, stepped, open to fracture zone below	+	organics (up to 1/8" long) 101.0-103.5' - Same as 96.0-98.1'	-
-				100.1-100.7' - Fracture zone, with several	П	<ul> <li>except very weak to weak (R1 to R2),</li> </ul>	-
-			>10	large 3" subangular fragments and several 0 to 70 degree fractures	H	the rock is gray where it is stronger, voids (up to 1/16") cover 10-25% of	=
-	R8-HQ			100.7' - Fracture, horizontal, rough, stepped,	Ш	- the surface, cavities (up to 1/4") and	-
-	5 ft	0	>10	very weak (R1) rock and rounded core with faded color	╁┼	trace 3/4"-1" cavities with molds and casts, more voids in 103.2-103.5'	-
-	100%			102.85' - Fracture, 60 deg, rough, undulating,	曰	<ul> <li>103.5-105.15' - light olive gray, (5Y</li> </ul>	-
-			>10	healed 103.45' - Fracture, 25 deg, rough, undulating,	口	5/2), fine to very fine grained, moderate HCl reaction, medium	-
110_ -89.1				open — 103.65' - Fracture, horizontal, rough,	ш	<ul><li>strong to strong (R3 to R4), voids (up to 1/16") cover 10-15% of the</li></ul>	R8: 7 minutes
-			>10	stepped, very open	$\Box$	surface, cavities (up to 1/4") cover	-
-	111.0			104.25' - Fracture, 10 deg, rough, stepped, very open fracture with some fragments	$\Box$	<ul> <li>5% of the surface and frequency decreases with depth, rare larger</li> </ul>	100% circulation loss from
-			>10	105.15' - Fracture, 50 deg, rough, undulating,	目	cavities also decreasing with depth	111.0-116.0'
-				healed 105.35-105.45' - Fracture zone, rough, planar	坩	<ul> <li>105.15-105.8' - Same as</li> <li>101.0-103.5' except steep increase in</li> </ul>	-
1 -			>10	106.3' - Fracture, 20 deg, rough, undulating,	Ш	voids, more brownish	-
-	R9-HQ			open 106.55' - Fracture, 20 deg, rough, undulating	뮈	No Recovery 105.8-106.0'	-
-	5 ft 84%	25	2	to stepped, very open fracture	囯	_	-
-	07/0			106.7-106.85' - Fracture zone, 30 deg and 60 deg, subrounded	団	-	-
115			0	·	団	-	-
113					$\dagger \dagger$		



PROJECT NUMBER:

338884.FL

BORING NUMBER:

IT-01

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## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705495.9 N, 457735.8 E (NAD83)

ELEVATION: 20.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT: CME 75 S/N 252437, mud rotary, HQ tools, HW casing

WATER LEVELS: 42.0 ft bgs on 6				6/28/07 START : 6/27/2007 END :	6/29/2	007	LOGGER: J. Schaeffer, D. Thon					
≥ □ ≈	્ર			DISCONTINUITIES	نِ	L	LITHOLOGY	COMMENTS				
DEPTH BELOV SURFACE ANI ELEVATION (fl	CORE RUN, LENGTH, AND RECOVERY (%	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNES.	SYMBOLIC LO		ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.				
-94.1		_	>10	106.85' - Fracture, horizontal, rough, planar.	<del>ا</del> ت	╁	Limestone	R9: 4 minutes				
120 -99.1 -125 -104.1	(%) CORE RUN (ENGITH, AND 10.09 (P. 10.00 (P.	(%) GOD (%)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND			MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD				
- - - - -				120.5, 120.55' - Fracture, horizontal, rough, planar, tight 120.55-120.8' - Fracture zone, sand to gravel sized fragments, weakly to non competent 1208' - Fracture, horizontal, rough, undulating to stepped 121.5' - Fracture, 50 deg, smooth, undulating, open, with fragmentation to smaller	- - -	-	moderate HCl reaction, very weak (R1), voids (up to 1/16") cover 25% of the surface, trace cavities (1"-1/2" elongate infilled with grayish silt-sized infill) 116.75-118.15' - Same as 116.0-116.75' except weak to extremely weak (R2 to R0), hard to determine varied equities					
				orthogonal fractures at same depth		T	determine voids and cavities					



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	IT-01	SHEET	8	OF	8

PROJECT: Progress Energy Florida - COLA Investigation, Levy County Site LOCATION: 1705495.9 N, 457735.8 E (NAD83)

ELEVATION: 20.9 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, HW casing ORIENTATION : Vertical

WATER L	EVELS: 42	.0 ft bo	gs on 6	6/28/07 START : 6/27/2007	END : 6/2	9/200	DOT LOGGER: J. Schaeffer, D. Thor	nas
>00			_	DISCONTINUITIES		<sub>O</sub>	LITHOLOGY	COMMENTS
N (#	N, AND 3Y (%		RES T	DESCRIPTION		SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI ATIO	E RU	(%) <sub>Q</sub>	17.05 19.05	DEPTH, TYPE, ORIENTATION, ROUGHN	IESS,	30	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
EV.	SECO	Ø	RAC PER I	PLANARITY, INFILLING MATERIAL AN THICKNESS. SURFACE STAINING. AND TIG		ΥME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
DEPTH BELOW SURFACE AND SURFAC	CORE RUN, LENGTH, AND RECOVERY (%)	ROI	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AN THICKNESS, SURFACE STAINING, AND TIG  121.75' - Fracture, 50 deg, smooth, undulating, tight to healed fracture with orientation as 121.5 fracture  124.05' - Fracture, 25 deg, rough, undu some fragmentation  124.55' - Fracture, 60 deg, rough, undu open fracture with a near horizontal fracture and fragmentation  125.45' - Fracture, horizontal, smooth, undulating, open  125.45-125.9' - Fracture zone, fracture with sub angular fragments 1/2-2" in siz	some - lating, - cture - zone -	SYM	AND ROCK MASS CHARACTERISTICS  118.65-120.3' - Same as 116.75-118.15' except weak to medium strong (R2 to R3) Limestone 120.3-121.0' - Same as 116.0-116.75' except extremely weak to very weak (R0 to R1) 121.0-125.9' - moderate yellowish brown to dark yellowish orange, (10YR 5/4, 10YR 6/6), fine grained, moderate HCI reaction, very weak to medium strong (R1 to R3), gradual transitions, voids (up to 1/16") cover 10-25% of the surface, trace open cavities (1/4"), larger completely infilled cavities over 2% of the surface, 121.0-124.0' medium strong (R3), larger cavities (inches long) are infilled with weaker rock with voids cover 25% of the surface, percent of voids decreases to 10-15% with depth, 124.0-125.9' increasing weakness, very weak (R1) at bottom No Recovery 125.9-126.0' Bottom of Boring at 126.0 ft bgs on 6/29/2007	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	IT-02	SHEET	1	OF	7

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705642.1 N, 457838.7 E (NAD83)

ELEVATION: 29.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

						iry, auto nammer, NVV 100s, 4			ORIENTATION : Vertical
WATER	LEVELS	: 30.0 ft I	ogs on //		START : 7/1/2007	END : 7/2/2007 SOIL DESCRIPTION	LUGGE	≺ : J. 	Schaeffer, C. Dougherty  COMMENTS
≥□⊋				STANDARD PENETRATION		SOIL DESCRIPTION		<b>9</b>	COIVIIVIEN 15
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	TEST RESULTS	SOIL NAM	ME, USCS GROUP SYMBOL,	COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
H BE ATIO		RECOVE	ERY (ft)		MOISTURE	E CONTENT, RELATIVE DEI	NSITY OR	l S	DRILLING FLUID LOSS, TESTS, AND
FP.			#TYPE	6"-6"-6"	CONSISTEN	ICY, SOIL STRUCTURE, MIN	NERALOGY	×ΜΕ	INSTRUMENTATION
29.6	0.0			(N)	Poorly Grades	d Sand With Silt To Silty S	Sand (SD SM/	o T T	
29.0	0.0			0-2-3	SM)	u Sanu With Siit 10 Siity S	Sanu (SP-SIVI/	li l	SS-1 appears to be fill
_		1.0	SS-1	(5)		yellowish brown to modera			_
l _	1.5				(10YR 6/2 to 5	SYR 4/4), moist, loose, fine erate HCl reaction in carbor	to medium	1	_
					materials, mixe	ed carbonate and silica gra			
					nonplastic fine	es, trace roots			
								1	
-								1	
-								1	<del>-</del>
-								1	-
								1	-
5 24.6	5.0				Poorly Grader	d Sand With Silt (SP-SM)	_	13	-
			000	11-12-13	5.0-6.0' - pale l	brown with grayish brown,	(5YR 5/2	11	-
-		1.0	SS-2	(25)	with 5YR 3/2),	moist to wet, medium dens CI reaction, silica sand, 5-1	se, fine	111	-
_	6.5				\nonplastic fine		078	4	_
_								1	_
								1	_
								1	
-								1	_
-								1	1
10	10.0							1	-
19.6	10.0				Poorly Gradeo	d Sand (SP)			-
-		0.7	SS-3	4-7-11	10.0-10.7' - ligh	ht brownish gray grading to	yellowish		-
-		0.7	00-3	(18)	gray, (5YR 6/1	l to 5Y 8/1), moist, medium Cl reaction, silica sand, 5-1	0%	┨	-
-	11.5					es grading to <5%		-	-
-								-	-
_								4	_
_								1	_
l _								1	_
]									
15	15.0							1	]
14.6					Poorly Gradeo	d Sand (SP)			
-		0.7	SS-4	6-7-6	15.0-15.7' - Sa	ame as 10.0-10.7' except tres, trace fine organics	ace,	1	7
-	16.5			(13)	Tioripiastic fille	o, dade inte digarilos		1	-
-	10.5							1	-
-								$\mathbf{H}$	-
-								+	-
-								-	-
-								-	_
-								1	_
_								1	_
20									



PROJECT NUMBER:	BORING NUMBER:					
338884.FL	IT-02	SHEET	2	OF	7	

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705642.1 N, 457838.7 E (NAD83)

ELEVATION: 29.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WATER	LEVELS	: 30.0 ft l	ogs on 7/2	2/2007	START : 7/1/2007 END : 7/2/2007 LOGG	SER	: J. \$	Schaeffer, C. Dougherty
				STANDARD	SOIL DESCRIPTION			COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	E INTERVAL (ft) PENETRATION TEST RESULTS					SYMBOLIC LOG	
E SE		RECOVE	ERY (ft)	120111200210	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
PTH			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		/MB(	INSTRUMENTATION
E S E				(N)	B 1 0 1 10 1/0D)	_	Ś	
9.6	20.0			4-6-9	Poorly Graded Sand (SP) 20.0-20.9' - brownish gray, (5YR 4/1), moist to wet,	4		SS-5 is coarser grained than previous samples –
_		0.9	SS-5	(15)	20.0-20.9' - brownish gray, (5YR 4/1), moist to wet, medium dense, fine to medium grained, no HCI	/-		=
_	21.5				reaction, silica sand, 5% nonplastic fines	/ ┧		_
_						4		_
_						4		=
_						4		_
_					0 W	4		_
_					Cuttings from bit above SS-6 are <b>Fat Clay (CH)</b> - greenish gray (5G 6/1), wet, high plasticity, no	4		_
_					dilatancy, no HCl reaction	4		_
25	<b>25</b> .9		00.0	50/48	- N. D			Driller's Remark: Hard at 24.5' —
4.6		0.0_/	SS-6 /	50/1" (50/1")	No Recovery 25.0-25.1' 25.0' - a few coarse grained limestone fragments,	$\prod$		_
_					very mild HCl reaction	/ 4		
-						4		Driller's Remark: 100% circulation loss at 26.0'; grinding to 26.0-26.5'; then softer –
_						4		drilling (still hard)
-						4		=
-						4		_
-						4		_
-						4		_
-						4		_
30	30.0				Limes to see Annal Oilte Occupt (OM)	_	T-171	Daille de Descado 20 0 05 0 mandione hand as
-0.4				15-31-61	Limestone And Silty Sand (SM) 30.0-31.5' - medium gray, light olive gray and	4		Driller's Remark: 30.0-35.0' medium hard, no circulation
_		0.9	SS-7	(92)	30.0-31.5' - medium gray, light olive gray and yellowish gray, (N5, 5Y 6/1 and 5Y 8/1), wet, dense,	4		<del>-</del>
_	31.5				strong HCl reaction, fine to medium sand-sized, 3" \( \square\) lense of limestone, silty sand lenses 1/4" thick, 30%			_
_					low to medium plastic fines, few carbonate material	/ 4		_
-						4		-
-						4		=
-						4		_
-						4		_
-						4		
35 -5.4	35.0 35.2	0.0	SS-8 /	50/2"	No Possyany 25 0 25 21	-		Dillier's Remark. Soiler at 34.5
-5.4		0.0	33-0	(50/2")	No Recovery 35.0-35.2'	7		-
_						4		-
_						4		-
_						4		_
-						4		-
-						4		-
-						4		-
-						4		-
-						4		-
40						$\dashv$		



PROJECT NUMBER:

338884.FL BORING NUMBER:

IT-02 SHEET 3 OF 7

## **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705642.1 N, 457838.7 E (NAD83)

ELEVATION: 29.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

DRILLING METHOD AND EQUIPMENT: CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 4-7/8" tri-cone bit

WATER	R LEVELS	: 30.0 ft l	ogs on 7/2	2/2007	START : 7/1/2007 END : 7/2/2007 LC	END : 7/2/2007 LOGGER : J. Schaeffer, C. Dougherty				
				STANDARD	SOIL DESCRIPTION		ניו	COMMENTS		
DEPTH BELOW SURFACE AND ELEVATION (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	ON CONTRACTOR OF THE PROPERTY					
표원인		RECOVE	ERY (ft)	TEOT REGULTO	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND		
PT A Y			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		MB(	INSTRUMENTATION		
SUB				(N)			SΥ			
-10.4	40.0				Silty Sand (SM)	_		Driller's Remark: No circulation at 40'.0		
	1	1.5	SS-9	30-43-31 (74)	40.0-41.5' - light olive gray, (5Y 5/2), wet, very dens mild HCl reaction, very fine to medium sand-sized,	e, - all		(below casing) –		
	41.5			(1-7)	carbonate materials, 40-45% nonplastic fines, white			1		
l '	1				thread-like lenses from 41.3-41.5', 1" limestone pied at 41.5', fossiliferous, mild HCl reaction	ce /		1 1		
	1				at 41.0, 1000microus, filia Fronteaction	/ -	l	-		
·	1					-	ı	Driller's Remark: Harder at 42.5'; still no		
	1					-	ł	circulation. HW casing to 40.0'. Unclear if		
	1					-	ł	circulation loss is into formation at depth below casing or along the sides of the		
	-					-		casing.		
	4					-		-		
45 <u> </u>	45.0 45.3	0.0	SS-10	50/3"	No Recovery 45.0-45.3'		$\vdash$			
-15.4	- 70.0	U.U	33-10	(50/3")	45.0' - a few limestone fragments and cuttings, light	Γ-	Г	casing set to 45.0'		
					olive gray (5Y 5/2), highly fossiliferous, mild to	/ -		Driller's Remark: 45.0-50.0' not as hard as		
					moderate HCI reaction	╜.		above		
<b>l</b> .						_		_		
						_		_		
						_				
·	1					_		1		
	1					-	1	1		
50	50.0					-	1			
-20.4					Silty Sand (SM)			Driller's Remark: 50.0-55.0' drills hard and		
	1	0.9	SS-11	21-14-9	50.0-50.9' - mottled light olive gray, (5Y 5/2), wet, dense, mild to strong HCl reaction, fine to medium	-		soft (alternates), feels like lenses -		
	+ _, _	0.0	00 11	(23)	sand-sized, predominantly fine, 15-30% nonplastic	:o [		SS-11 does not have massive a appearance		
	51.5				low plasticity fines varies throughout sample in lens	es,  -	ł	-		
	-				1" thick lens of coarse sand to fine gravel-sized lenticular limestone at 50.3', fine to coarse	-		-		
	-				gravel-size, rounded limestone fragments with silt	-	ł	-		
	4				matrix surrounding fragments, HCl reaction varies from mild in limestone lense (50.0-50.5') to modera	- ا ۾	l	-		
	4				to strong in fragments (50.5-50.9')					
	4						1			
	1					_				
55_	55.0						ļ	]		
-25.4	]			10 10 10	Silty Sand With Limestone Fragments (SM) 55.0-56.3' - yellowish gray to light olive gray, (5Y 7/2	<b>)</b>		]		
	]	1.3	SS-12	12-19-13 (32)	to 5Y 5/2), wet, dense, fine to coarse grained, mild to					
	56.5			(5-)	moderate HCl reaction, similar to SS-11, all carbonate, 30-40% nonplastic fines, 2" limestone	_	Ш			
					\fragment at top of sample, highly fossiliferous	/-		]		
	1						1	]		
'	1					-	1	]		
	1					-	1			
'	1					-	1			
	1					-	1			
	1					-	ł	-		
60_	+						$\vdash$	-		



PROJECT NUMBER:

33884.FL BORING NUMBER:

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# **SOIL BORING LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705642.1 N, 457838.7 E (NAD83)

ELEVATION: 29.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WATER	LEVELS	: 30.0 ft l	ogs on 7/2	2/2007 S	TART : 7/1/2007 END : 7/2/2007 LOGGER	R : J	. Schaeffer, C. Dougherty
				STANDARD	SOIL DESCRIPTION	ڻ	COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	COLL NAME LIGOR OPOLID CVARDOL COLOD	0	DEDTIL OF CACING DRILLING DATE
A A CE		RECOVE	RY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	Į į	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (#)			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC	INSTRUMENTATION
-30.4	60.0			(,	Limestone		Finished drilling at 60.0' on 7/1/2007, HW
_		1.1	SS-13	24-8-7 (15)	60.0-60.3' - mild HCl reaction, in 1/4" pieces, same as limestone fragment in SS-12	1	casing to 45.0' - Resume drilling at 7:30 7/2/2007
-	61.5			(13)	Silty Sand With Limestone Fragments (SM)		
_					60.3-61.1' - mottled light olive gray, (5Y 5/2), wet, medium dense, fine to coarse grained, mild to		1
					moderate HCl reaction, similar to SS-11 and SS-12, all carbonate materials, 15-35% nonplastic fines		
_					varied in lenses, 15% fine gravel-sized limestone		
_							_
_					-		_
-					-	-	-
65 <u> </u>	65.0				Silty Sand (SM)	П	SS-9 through SS-14: Darker gray colors
-		1.0	SS-14	24-55-48	65.0-66.0' - mottled light olive gray to medium gray, -	1	more associated with coarser lenses –
-	66 F	1.0	33-14	(103)	(5Y 5/2 to N5), wet, very dense, predominantly fine to medium grained, mild to moderate HCl reaction, ☐	11.1	<u> </u>
-	66.5				similar to above, all carbonate materials, 5-10% coarse sand, 20-40% fines (varies in lenses)	ł	-
-					Coarse saila, 20-40 // lines (valies in lenses)	1	-
-					-		1
_					_		1
l _					_		
70	70.0				074 0 1/010	1	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
-40. <del>4</del>		l		18-27-31	Silty Sand (SM) 70.0-71.1' - pale to moderate yellowish brown with	$\  \ $	Driller's Remark: Materials are not coreable (wash out of core barrel)
-		1.1	SS-15	(58)	scattered medium gray lenses, (10Y 6/2 to 10YR 5/4 with N5), wet, very dense, fine to medium grained,		SS-9 through SS-15 appear to be interbedded carbonate silts, sands with some
-	71.5				mild to moderate HCl reaction, similar to above, 35% / -	ł	gravels and limestone lenses are irregularly -
-					nonplastic fines		shaped and sized.
-					<del>-</del>		-
-					-	1	-
-					<del>-</del>	1	1
					_	1	1
75	75.9						
-45. <del>4</del>		0.0	\SS-16/	50/1.5" (50/1.5")	No Recovery 75.0-75.1'	Ī	Driller's Remark: Still in and out of harder and softer lenses
_				(00.110)	<u>-</u>	1	-
_					-	ł	_
-					-	1	-
-					-	ł	-
-					-	ł	-
-					<del>-</del>	1	-
-					<del>-</del>	1	1
80					-	1	1
						T	



PROJECT NUMBER:	BORING NUMBER:				
338884.FL	IT-02	SHEET	5	OF	7

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705642.1 N, 457838.7 E (NAD83)

ELEVATION: 29.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

WATER	LEVELS	: 30.0 ft l	ogs on 7/2	2/2007 S	START : 7/1/2007 END : 7/2/2007 LOGGER : J. Schaeffer, C. Dougherty
				STANDARD	SOIL DESCRIPTION COMMENTS
AND (#)	SAMPLE	INTERVA	L (ft)	PENETRATION TEST RESULTS	
H BE ACE ATIO		RECOVE	ERY (ft)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
DEPTH BELOW SURFACE AND ELEVATION (ft)			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
-50.4	80.0	0.8	SS-17	41-50/5"	Silty Sand With Limestone Fragments (SM) SS-17: Lenses of limestone pieces
	80.9	0.0	33-17	(91/11")	80.0-80.7' - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild to previous samples.
l _					moderate HCl reaction, similar to SS-15, 25-30% Inonplastic fines, 15-20% fine gravel-sized limestone Industrial is likely to wash out of core
_					Mixed Materials barrel
_					80.7-80.8' - moderate yellowish brown to dark yellowish brown to dusky brown, (10YR 5/4 to 10YR
-					4/2 to 5YR 2/2), moist, moderate HCl reaction, lense of mixed silts, fine to coarse sand-sized angular
-					limestone and organic soil
-					
85 -	85.0				<b> </b>
-55.4				5.0.0	Sandy Clay With Silt (CL-ML) 85.0-86.1' - moderate yellowish brown, (10YR 5/4),
		1.1	SS-18	5-8-9 (17)	wet, stiff, nonplastic, rapid dilatancy, mild to moderate
_	86.5				HCI reaction, 5-10% very fine to fine sand, all carbonate
_					
-					
-					Driller's Remark: 100% water loss at 88.0'
-					Driller's Remark: Extremely soft at 88.5',
-					possibly cavity
90_					_]
-60.4	90.5		00.40	FO/F!!	Driller's Remark: For SS-19 rods dropped to 90.5', SPT taken at 90.5', potential cavity
_	90.9	0.4	SS-19	50/5" (50/5")	90.5-90.9' - mild to moderate HCl reaction, similar to
_					SS-17 and SS-18, all carbonate materials, 1" rounded / gravel-sized limestone piece, several 1/2" angular
-					\pieces   -
-					Begin Rock Coring at 91.0 ft bgs See the next sheet for the rock core log
-					<b>1</b>
					]
_					<b>.</b> .
95 <u> </u>					_
-03.4					<b> </b>
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					] [
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100					++



PROJECT NUMBER:

338884.FL

BORING NUMBER:

IT-02

SHEET 6 OF 7

## **ROCK CORE LOG**

PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705642.1 N, 457838.7 E (NAD83)

ELEVATION: 29.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, HW casing

WATER	LEVELS : 30	.0 ft b	gs on	7/2/2007 START : 7/1/2007 END : 7/	2/2007	7 LOGGER : J. Schaeffer, C. Doug	herty
≥∩≎	(%)			DISCONTINUITIES	ပ္ခ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
95 -65.4 -	91.0 R1-HQ 5 ft 72% 96.0	33	>10 >10 NR >10 0	91.0-91.6' - Fracture zone, rough, undulating, numerous small fragments 3/16"-1-1/2" in size 91.9' - Mechanical break 92.1-92.6' - Fracture zone, rough, undulating, numerous small fragments 3/16"-1" in size 94.0-94.5' - Fracture zone, 0-45 deg, rough, undulating, several fragments up to 9/16", film of organic material on some faces 94.8-95.1' - Fracture zone, 0-90 deg, rough, undulating, fragments up to 2" 95.4, 95.5, 96.5' - Mechanical break (3) 97.0-98.6' - Fracture zone, 0-90 deg, rough,		Limestone 91.0-92.6' - moderate olive brown, (5Y 4/4), fine grained, mild to moderate HCl reaction, medium strong (R3), voids (<1/16") over 25% of surface, larger voids (up to 3/16") over 5% of surface, moderately fossiliferous, trace organics No Recovery 92.6-94.0' Limestone 94.0-96.0' - Same as 91.0-92.6' except light olive gray, (5Y 5/2), strong (R4) rock at 97.7-97.8'	Driller's Remark: Water at 30.0' below ground surface before extending casing from 45.0-90.0' Driller's Remark: Only about 25% return on circulation Driller's Remark: Core barrel hung up, barrel was pulled out, cleaned and put back in to finish run R1: 14 minutes  Driller's Remark: Loss of
  100 -70.4	R2-HQ 5 ft 100% 101.0	50	>10 >10 2	undulating, fragments from <3/8" - 3"  98.8' - Mechanical break, brown and gray staining on surfaces  99.6-99.8' - Fracture, horizontal on lower face, 30 deg on upper face, crushed rock material and fragments up to 1/2"  99.8-100.2' - Fracture, <5 deg		Limestone  98.5-101.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCI reaction, medium strong (R3), small voids (<1/16") over about 30% of surface, larger voids (3/16"x3/8") over about 5% of	circulation at about 97.0' -
105 -75.4	R3-HQ 5 ft 84% 106.0	57	>10 0 1 0 0 NR	100.8' - Mechanical break 101.0-102.1' - Fracture zone, numerous fragments, film of carbonate derived silt in fractures  103.1' - Mechanical break  103.9' - Fracture, horizontal, film of carbonate derived silt infill  104.8' - Mechanical break		surface, fossil molds and casts common, very fossiliferous, small fragments of gray limestone make up <5% of surface. Thin (1/2") layer of gray limestone at 93.8' Limestone 101.0-105.2' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCI reaction, medium strong (R3), voids (<1/16") cover 25% of surface to about 102', then only 15%, trace voids larger than 1/16", trace organics No Recovery 105.2-106.0'	SC-1 collected at 103.1- 103.9' - R3: 8 minutes -
- - - 110 -80.4	R4-HQ 5 ft 68% 111.0	47	2 >10 1 >10 >10 NR	106.5, 106.6' - Fractures, horizontal, rough, undulating, tight to open up to 1/16" 107.0-107.2' - Fracture zone, rough, undulating, numerous small fragments (3/16" to 9/16") 107.7-107.8' - Fracture zone, same as for 107.0-107.2' 107.8-108.1' - Fracture, vertical, rough, undulating, tight 108.3-108.7' - Fracture, 70 deg, closed 109.0-109.4' - Fracture zone		Limestone  106.0-109.4' - pale yellowish brown transitions to dusky yellow, (10YR 6/2 to 5Y 6/4), fine grained, moderate HCl reaction, medium strong (R3), <1/16" voids cover about 15% of surface, trace larger voids (up to 3/16"), trace organics 106.8-107.9' - voids more abundant (35% for <1/16" voids and 5% for up to 3/16" voids). Larger voids and fossil molds are up to 3/16"x1-3/16" 108.1' - a large cavity measuring about 1-3/16"x2-3/8"  No Recovery 109.4-111.0'	- - - - - -



PROJECT NUMBER:	BORING NUMBER:					
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PROJECT : Progress Energy Florida - COLA Investigation, Levy County Site LOCATION : 1705642.1 N, 457838.7 E (NAD83)

ELEVATION: 29.6 ft (NAVD88) DRILLING CONTRACTOR: Universal Engineering Sciences, Ft. Myers, FL; Driller: R. Woodard

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, HW casing ORIENTATION : Vertical

WATER	LEVELS: 30	.0 ft b	gs on T	7/2/2007 START : 7/1/2007 END : 7/	2/200	7 LOGGER : J. Schaeffer, C. Doug	herty
≥ ∩ ⊕	(9)			DISCONTINUITIES	Ō	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE AND ELEVATION (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	nook iii E, oolok,		SIZE AND DEPTH OF CASING,
H BI	E RU 3TH, OVEF	(%) O	STUF FOO	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOLI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
DEP- SURI ELE/	COR	ROI	FRA( PER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	-		>10	111.0-111.4' - Fracture zone, rough,	Ħ	Limestone	R4-HQ: 6 minutes
_				undulating, numerous fragments 3/8" to 1-3/16" in size	世	- 111.0-111.4' - moderate olive brown, (5YR 4/4), fine to coarse grained	Driller's Remark: Apparent - cavity beginning at about
_					ь	gravel-sized grained, moderate HCl reaction, weak to medium strong (R2	110.0', little resistance to drilling
					Ь	to R3), very fossiliferous, voids	
_	R5-HQ 5 ft	0				(<1/16") over 30% of surface, larger voids (up to 3/16"-3/8") and fossil	_
_	8%		NR		$\vdash$	molds over 5% of surface No Recovery 111.4-116.0'	_
_					+	- No Recovery 111.4-110.0	-
115 <u></u> -85.4				_	H		R5: 1 minute
-	440.0				F	-	-
-	116.0			116.0-116.2' - Fracture zone, rough,	F	Limestone	-
-			2	undulating, several small fragments (0.5-1.5") 116.6' - Fracture, horizontal for lower face, 50	H	<ul> <li>116.0-117.0' - yellowish gray transitions to light olive gray by</li> </ul>	_
-				deg for upper face, open, film of silty fine sand on lower face	];	116.3', (5Y 7/2 to 5Y 6/1), fine grained, mild to moderate HCl	_
				Salid off lower face	Ħ	reaction, strong (R4), voids (<1/16")	_
_	R6-HQ 5 ft	13			Ħ	over 5% of surface, frace larger voids (up to 3/16")	_
_	20%		NR			No Recovery 117.0-121.0'	_
					H	-	-
120 <u> </u>				_	Ħ	_	R6: 2 minutes
-	121.0				Ħ	-	-
_	121.0			121' - Unconsolidated material. No fractures.		Poorly Graded Sand With Silt (SP)	-
			0			- 121.0-125.6' - light gray to light olive gray, (N7 to 5Y 6/1), wet/saturated,	
_			0			medium dense, fine grained, silica sand, about 10% fines (carbonate	_
_	5-110					derived), well rounded grains, 124.4'	_
_	R7-HQ 5 ft	0	0		-	- a 1" limestone fragment, 124.8' - fines increasing to about 50%, color	-
-	92%				-	change to olive gray (5Y 3/2)	-
125			0		1	-	-
-95.4			0	_	1	_	R7: 1 minute
-	126.0				1	No Recovery 125.6-126.0'	
-						Bottom of Boring at 126.0 ft bgs on 7/2/2007	
-			NR		1	-	-
-					-	-	-
-					$\mathbf{I}$	-	-
-					1	-	-
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